MONTHLY WEATHER REVIEW.

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The Monthly Weather Review is based on data from about 3500 land stations and many ocean reports from vessels taking the international simultaneous observation at Greenwich noon.

Special acknowledgment is made of the data furnished by the kindness of cooperative observers, and by R. F. Stupart, Esq., Director of the Meteorological Service of the Dominion of Canada; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Capt I. S. Kimball, General Superintendent of the United States Life-Saving Service; Commandant Francisco S. Chaves, Director of the Meteorological Service of the Azores, Ponta Delgada, St. Michaels, Azores; W. N. Shaw, Esq., Director Meteorological Office, London; H. H. Cousins, Chemist, in charge of the Jamaica Weather Office; Rev. L. Gangoiti, Director of the Meteorological Observatory of Belen College, Havana, Cuba.

As far as practicable the time of the seventy-fifth meridian is used in the text of the Monthly Weather Review.

Barometric pressures, both at land stations and on ocean vessels, whether station pressures or sea-level pressures, are reduced, or assumed to be reduced, to standard gravity, as well as corrected for all instrumental peculiarities, so that they express pressure in the standard international system of measures, namely, by the height of an equivalent column of mercury at 32° Fahrenheit, under the standard force, i. e., apparent gravity at sea level and latitude 45°.

FORECASTS AND WARNINGS.

By Prof. E. B. Garriott, in charge of Forecast Division.

IN GENERAL.

In the United States April was exceptionally cold from the Rocky Mountains to the Atlantic coast, and at many points average and minimum temperatures were the lowest recorded in many years. Frosts were frequent in the Gulf and South Atlantic States during the first and second decades of the month. On the 3d light frost occurred over the Florida Peninsula as far south as the twenty-eighth parallel, and was noted on the 14th and 15th in northern Florida. After the 10th frost was frequent in parts of the North Pacific States. At the close of the month freezing temperature was reported in northwestern Texas. In the latter portion of the third decade wintry weather prevailed in Europe, and snow fell in Germany and thence over the northern portion of the Italian Peninsula.

In the Rocky Mountain districts the first half of the month was mild and the latter half cold, with a general deficiency in precipitation. In California the month was a quiet one, with light rainfall. In the North Pacific States there were two rain periods, one from the 4th to the 6th and the other on the 9th and 10th. The heavy rains of the first period produced a bank-full stage of water in the Willamette River at Portland, Oreg.

Snowfalls over interior and eastern districts of the United States were the heaviest in many years, if not for the whole period of observation; during the third decade 1 inch to 12 inches of snow fell in the Dakotas, Minnesota, Wisconsin, upper Michigan, and northern lower Michigan. During this period snow and sleet storms occurred in the States of the middle Mississippi Valley, and heavy rains in the Southwestern States. At New Orleans, La., a depth of nearly 7 inches of rain was recorded on the 25th. This storm had prevailed at the close of the second decade on the middle-eastern slope of the Rocky Mountains, where maximum depths of snowfall ranged from 1 foot to 1½ feet. In the second decade snow fell in Tennessee on at least two dates. and the close of that decade was marked by snowstorms in Ohio, Pennsylvania, and New York. In New England the heaviest snowstorm of the month prevailed from the 8th to 10th, when the fall varied from 6 inches on the coast to 12 or 18 inches in the interior.

Referring to the frosts of the second decade in the Middle-western States the Morning Republican, of Springfield, Mo., remarks in its issue of April 17, 1907, as follows:

It is due to the Weather Bureau to state that its forecasts of the recent frosts and freezes have been marvelously accurate. Had the fruit growers of Missouri, all of whom received timely warnings, possest the same facilities for firing or smudging their orchards as do the orange growers of Florida and California, there would have been little or no loss.

A culminating feature of March weather was a storm development off the extreme southeast coast of the United States, and a cool wave over the eastern districts that followed a period of exceptionally high temperature over the eastern half of the United States. This storm broke a long drought over the Florida Peninsula that had caused considerable damage to gardens and fruit trees that were not irrigated. The storm that developed marked intensity off the southern Florida coast during the opening days of April appears to have resulted from a union of two barometric depressions over that region, one of which had been forced southward over Florida by an area of high barometer to the northward, and the other a depression that had appeared over the Caribbean Sea during the latter part of March. The presence of the latter depression was shown by observations taken at San Juan, P. R., from March 26 to 29. At that station brisk north and northwest winds, with a moderately high sea from the north, prevailed during the night of the 26–27th. The morning of the 27th the sea became very high from the north, and vessels were obliged to stand off the harbor during the 27th and 28th. A very heavy sea from the north continued during the 28th. On the 29th the sea moderated from the west and north, and vessels were able to enter the harbor. The morning of April 1 a well-defined storm was central off the east Florida coast north of Jupiter. In the meantime a gale had sprung up that extended from the southern Florida coast over the western Bahamas and the middle and west Cuban coasts, and continued over those regions until the 3d, with maximum wind velocities 48 miles an hour at Key West the morning of the 2d, and 60 miles an hour at Havana the morning of the 2d. By the morning of the 4th the center of this disturbance had past to a position near and southeast of Bermuda, and by the 6th had merged with an extensive area of low barometer that from the beginning of the month had extended from the British Isles westward over the Atlantic. Storm warnings in connection with this storm were ordered at all ports on the southern Florida coast the evening of March 31.

Storms of unusual severity were occasionally encountered

along the transatlantic steamer routes, those of the second and third decades of the month being particularly severe. Several storms of marked strength visited the Great Lakes during the first and second decades, those of the 7th to 9th, and 11-12th being the most important. The steamship *Arcadia* left the port of Manistee the afternoon of the 12th while storm warnings were displayed and was lost with all on board. The severest storm of the month on the North Pacific coast occurred on the 5th when the wind reached a velocity of 85 miles an hour from the southeast at North Head, Wash.

About 1 a. m. of the 5th a tornado past thru the northern portion of Alexandria, La., killing several persons, wrecking many houses, and overturning an empty passenger train. This storm was apparently one of a group of several severe local storms that visited parts of central and southern Louisiana and southern Mississippi, causing, so far as can be learned, a loss of 15 to 20 human lives, and property destruction aggregating several hundred thousand dollars.

BOSTON FORECAST DISTRICT.

The average temperature for New England was the lowest recorded for April during the last eighteen years. Precipitation was in excess, except in Connecticut. From the 8th to the 10th snow fell to depths that varied from 6 inches on the coast to from 12 to 18 inches in the interior. Attending this snowstorm was one of the severest gales of the season. Timely warnings were issued for the storm, and so far as known, there was no damage to shipping or loss of life.—*J. W. Smith, District Forecaster.*

NEW ORLEANS FORECAST DISTRICT.—*Not received.*

LOUISVILLE FORECAST DISTRICT.

The month was the coldest April during the period of Weather Bureau observations. Freezing temperatures and frosts were of frequent occurrence. Snow fell over a large portion of Kentucky and Tennessee on the 9th, 10th, and 13th. A severe thundersquall, with heavy hail and a maximum wind velocity of 52 miles an hour, visited Louisville the afternoon of the 7th. Warnings issued in connection with frosts were justified.—*F. J. Walz, District Forecaster.*

CHICAGO FORECAST DISTRICT.

The month was marked by unusual cold over the entire district. Open ports on Lake Michigan were advised regarding storms of the first decade of the month. The display of storm warnings on the Great Lakes was resumed for the season on the 10th. Storm warnings were ordered for the upper Lakes the night of the 11th and on the morning of the 12th. The steamship *Arcadia*, that left Manistee the afternoon of the 12th while the storm warnings were flying, foundered on Lake Michigan and was lost with all on board. Storm warnings were again hoisted on the 15th and 24th.—*H. J. Cox, Professor and District Forecaster.*

DENVER FORECAST DISTRICT.

During the first half of the month temperatures were generally above the seasonal average. During the latter half cold was marked and prolonged on the eastern slope of the Rocky Mountains, and in the eastern counties of Colorado the average temperatures for the month were the lowest in twenty years. Frosts and freezing temperatures, for which warnings were issued, occurred, except in southern Arizona. Precipitation was deficient, except in eastern and southwestern Colorado and northern New Mexico. Exceptionally heavy snow occurred on the 19th and 20th.—*F. H. Brandenburg, District Forecaster.*

SAN FRANCISCO FORECAST DISTRICT.

The month was on the whole quiet, with unusually light rainfalls. The depressions that appeared were of moderate intensity. No storm or frost warnings were issued.—*A. G. McAdie, Professor and District Forecaster.*

PORTLAND, OREG., FORECAST DISTRICT.

Nearly all the precipitation of the month fell from the 4th to the 6th, and on the 9th and 10th. The rains of the first period were attended by severe gales and by a bank-full stage of water in the Willamette River at Portland. After the 10th the weather was dry, with cool nights and frequent frosts the occurrence of which in nearly every instance was forecast twenty-four hours in advance.—*E. A. Beals, District Forecaster.*

RIVERS AND FLOODS.

The crest of the March flood past Memphis on March 30 and 31, and reached the mouth of the river about the middle of April. Stages were, as a rule, somewhat above flood heights, but no damage has been reported.

Warnings giving the time and height of the flood crest were issued from five to twelve days in advance, and the difference between the forecast and the actual stages averaged but a few tenths of a foot.

There was also some moderately high water in the upper Mississippi River due to the run-off from the melting of the accumulated winter snows in Minnesota and Wisconsin. Flood stages were not quite reached, except at Leclaire, Iowa, and Hannibal, Mo., where they were slightly exceeded.

Warnings of the flood were issued in the Davenport, Iowa, district, which extends from just below Dubuque to Davenport. They were nearly a week in advance of the flood, and the final warnings, from three to five days in advance of the crest, were correct to within 0.2 foot. There was very little flooding, property in danger from seepage water was removed, and the damage was comparatively trifling.

Warnings for the flood in the vicinity of Hannibal were also very accurate. Some unprotected lowlands were overflowed, but no material damage resulted.

The Ohio River fell steadily without special incident, while the Missouri River changed but little.

Navigation opened for the season at Dubuque, Iowa, on the 1st, and at St. Paul on the 19th.

The abnormally high temperatures of the closing days of March caused a rapid melting of the remaining snow and ice in the upper Connecticut Valley, and warnings were issued on March 30 for the flood stage of 16 feet at Hartford, Conn., on the following day. The flood wave, however, was delayed somewhat, and the crest stage of 16 feet was not reached until the morning of April 1.

There were no other high waters, except in the lower Red River of the North, where the usual flood stages incident to the breaking up of the ice in the spring were experienced. Warnings for the river north of Moorhead, Minn., were first issued on March 27, and repeated almost daily until April 15. The highest stage reached at Moorhead was 29.8 feet, on March 30 and 31, 3.8 feet above the flood stage, and at Drayton, N. Dak., about 34 feet on April 15.

No ice was observed in the Missouri River below the mouth of the James River, and all above had disappeared by the 12th.

The ice in the Penobscot River at Mattawamkeag, Me., went out on the 17th, and the last ice was seen at West Enfield, Me., on the 23d.

The highest and lowest water, mean stage, and monthly range at 309 river stations are given in Table VI. Hydrographs for typical points on seven principal rivers are shown on Chart I. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Professor of Meteorology.*

SPECIAL ARTICLES, NOTES, AND EXTRACTS.

THE MEXICAN EARTHQUAKE OF APRIL 15, 1907, WITH NOTES ON THE NATURE OF MOVEMENTS INDUCED BY EARTHQUAKES.

By C. F. MARVIN, Professor of Meteorology. Dated April 26, 1907.

A marked period of repose from seismic activity appears to have prevailed, especially thruout the Western Hemisphere, after the Kingston earthquake of January 14, 1907. During an interval of almost exactly three months the Weather Bureau seismographs did not record any movements of noticeable magnitude until the early morning of April 15, when a very complete record was obtained of another great earthquake whose origin is now known to have been within or near the southwestern provinces of Mexico. The towns of Chilpancingo, Chilapa, Ayutla, and doubtless others from which press reports were not received, all near the Pacific coast, suffered very severely or were mostly destroyed.

Judging from the Weather Bureau record the disturbance was of very considerable violence, greatly exceeding the Kingston earthquake, and comparable in intensity with those in California in April and in Chile in August of 1906.

Table 1 gives the times and duration of the several phases usually characteristic of records of great distant earthquakes. The automatic records from which the results have been deduced are partly reproduced on Chart IX.

TABLE 1.—*Times and duration of phases. Mexican earthquake; beginning 1 hr., 14 min., 19 sec. a. m., 75th meridian time, April 15, 1907.*[1]

	N.-S. component.			E.-W. component.		
	h.	*m.*	*s.*	*h.*	*m.*	*s.*
First preliminary tremors began	1	14	19 a. m.	1	14	19 a. m.
Second preliminary tremors began	1	19	28 a. m.	1	19	34 a. m.
Principal portion began	1	26	56 a. m.	1	26	..* a. m.
Principal portion ended	1	43	17 a. m.	1	43	39* a. m.
End of earthquake	2	43	00 a. m.	3	48	00 a. m.
Duration of first preliminary tremors	0	5	9	0	5	15
Duration of second preliminary tremors	0	7	28	0	7	..
Duration of principal portion	0	16	21	0	17	..
Total duration of earthquake	1	28	41	2	33	41
Times of maximum motion	1	27	..	Pen off sheet.		
	1	31 to 33		Pen off sheet.		
Probable amount of actual maximum displacement (double amplitude)		5	mm.		7 mm.	
Period of pendulums		15.5 secs.			20 secs.	
Magnification of record		25	times.		20 times.	

* The beginning and ending of the principal portion in the east-west component are not sharply defined.

Before drawing attention to certain details of the records, it seems desirable to outline certain general characteristics of the movements which seismographs record.

In the first place, the most perfect instruments known at the present time still fail to give us a wholly faithful record of the vibrations of the ground during an earthquake, and, therefore, no exact deductions can be drawn from records thus far obtainable. The ground movements, moreover, are very complex and unfortunately seismographs such as the horizontal pendulum instruments in use at the Weather Bureau, like other forms, are influenced by more than one element of motion. For example, the record ordinarily produced by a horizontal pendulum may represent one or more of at least three possible elementary motions, i. e.: (1) A linear horizontal displacement of a vibratory nature. (2) The passage of undulations of the ground like long, shallow waves on the surface of water where the motion is literally a slight tilting and without translation. (3) The record may even be caused by a certain oscillatory rotation of the ground about a vertical axis. We can not tell, from the record itself, whether one or more than one of these several effects may have been operative.

From other sources of information we are justified in making the following statements concerning the general nature of the motion of the ground at a great distance from the origin of an earthquake:

(1) The motions are essentially vibratory motions, naturally more or less complex and of irregular character. No appreciable permanent dislocations, even of small amounts, appear to be indicated by records, even at relatively moderate distances from the origin.

(2) The period of the main oscillations is relatively slow—scarcely less than ten seconds, and even twenty to thirty seconds and longer. The maximum acceleration is correspondingly small—one millimeter per second per second or less.

(3) The speed of propagation is relatively rapid—several miles per second.

(4) The wave length is accordingly very great—waves of 100 miles in length are plausible.

(5) Under these circumstances, the piers upon which seismographs may be installed, in fact whole buildings, and very considerable horizontal areas, move or vibrate *as a unit* under the influence of the distant earthquake. Consequently, there can not be important differential motions within restricted dimensions.

This explains how it is possible that relatively large ground vibrations, caused by a distant great earthquake, may persist at a place for many minutes, or even hours, and be recorded by suitable seismographs, yet be entirely unfelt by individuals, and be unmarked by creaking of buildings or other tangible evidence of the disturbance.

The case is very different with nearby felt earthquakes even of very feeble intensity. The period of vibration is small, the speed of propagation slower, the wave length accordingly shorter, and the acceleration greater. All such characteristics combine to favor differential motions within limited distances, and the resulting distortion, wrenching, and displacement of structures typical of earthquake effects.

In great destructive earthquakes the intensity as measured by the maximum acceleration of the ground motion may attain to about one-third the acceleration of gravity—that is, to from 3000 to 4000 millimeters per second per second.

We must conclude, from what has already been said, that, at a distance from an origin, the seismograph pier, in fact, the whole material environment, *moves as a unit*. Now, in accordance with well known principles of mechanics, an elementary portion of the motion of the pier during any brief interval of time, may consist of one or both of two separate kinds of motion. (1) The pier may undergo simple linear displacement in some particular direction; or (2), the pier may execute a movement which is an elementary rotation about some particular axis. That is, we may have linear translation along a line, or angular rotation about some axis.

It should always be recognized that these two elementary motions may possibly exist, either separately or simultaneously, but, at the same time, other considerations enable us to see that some motions are more probable than others.

Now it is impossible to so dispose seismographs as to record directly these elementary motions themselves. The best that seismographs are able to do is to pick up one or more resolved components of the primary elemental motions. Since we have two possible elemental movements, and since each elementary motion can have three resolved components, it must therefore follow that six possible resolved components, each separate

[1] When this earthquake was recorded the vibrator device attached to the Weather Bureau seismographs to diminish friction (see Weather Review, May, 1906, pp. 212-217) was, for experimental purposes, temporarily inactive on the north-south component, and, in consequence, this instrument was strongly damped by friction and distinctly less sensitive, as is shown by the damping tests made on the morning after the earthquake. The shorter duration of the earthquake and other features of the record of the north-south motion are also explained by this strong damping.

and distinct from the other, are required to fully represent the two original elemental motions. If we carry this to its logical conclusion, we see that six distinct seismographic records are required to fully represent the true movement executed by a seismograph pier affected by earthquake vibrations.

This requirement is very far from being fully met by any known forms of seismic apparatus, and, in consequence, earthquake records at the present time are, at best, more or less indefinite and incomplete.

The essentially six-fold nature of the motions indicated by seismographs will be more readily recognized under names that more specifically describe them. For example—

(*A*) The three resolved components of the linear displacement of a seismograph pier are, ordinarily—

(1) A horizontal north and south component of motion.

(2) A horizontal east and west component of motion.

(3) A vertical up and down component of motion.

(*B*) The three resolved components of the possible rotatory motion of the pier are conveniently—

(1) A component of rotation about a north and south line. This we may very properly call a tilting of the pier to the east or west.

(2) A component of rotation about an east and west axis. This will logically be called a tilting of the pier northward or southward. Finally—

(3) A component of rotation about a vertical axis. This component may, perhaps, best be called the twisting component of motion.

Entirely erroneous inferences have been drawn concerning the existence of twisting motions during destructive earthquakes, since the twisted displacement of chimneys, monuments, and even buildings is pointed to as evidence of exaggerated amounts of such motions that never really existed. The effects mistakenly attributed to twisting may be fully explained by the action of strictly horizontal displacements upon a tottering or otherwise imperfectly supported mass of considerable inertia.

The popular use of the word "twister", to characterize an earthquake during which rotary motions particularly are imagined to exist, is unquestionably wrong, and should be discouraged by those who write on seismological subjects with some authority and who it may be assumed are prompted by a desire to diffuse sound scientific ideas and teach habits of exact thought.

The foregoing indicates that the exact registration of earthquake phenomena is a very complex problem, and, altho theory calls for six resolved components of motion, yet we are fortunately able to conclude from other considerations that several of the components, if not entirely absent, are of relatively small magnitude and importance, especially at considerable distances from the origin. The horizontal and even the vertical displacements are no doubt of primary magnitude and importance; whereas the tilting and especially the twisting rotations are very small, or utterly inapplicable, except, perhaps, within a limited region near the origin.

Having thus explained, very briefly, the essential details of the ground movements induced by earthquakes, the attention of the reader is invited to a careful examination of the Weather Bureau records of the Mexican disturbance, especially during the initial portions which appear to be so well defined and distinct as to justifiy some attempt at a synthesis of the component motions recorded, with a view to deducing something concerning the actual motion of the ground at certain phases of the records.

The approximate location of the origin of this earthquake may be placed at latitude 17.5° N. and longitude 99.5° W. A little examination of the geographic relations of this origin to Washington (latitude 38° 54′ N. and longitude 77° 4′ W.) indicates that the direct line of propagation of the wave motion lies almost exactly northeast and southwest. From this circumstance we should expect that the Washington records of the north-south and east-west components of motion should closely resemble each other. This is found to be the case to a certain extent, as is shown by a comparison of the two component records, partly reproduced in the accompanying Chart IX.

If we assume that the records were produced by linear motions of the ground, as distinguished from tilting movements, then they must be interpreted as follows: A displacement toward the *top* of the sheet means that the pier moves to the *east* in the case of the east-west component record, but to the *south*, in case of the north-south component record, and vice versa. This is indicated by the letters on the margins of the records. The reader must understand that both instruments are mounted on one massive pier.

If the effects are due only to tilting motions, then a deflection of the record toward the *top* of the sheet means a tilting of the pier to the *west* in the case of the east-west component, and to the *north* in the case of the north-south component; that is to say, the motion of the ground is such as to cause a vertical line rigid with the pier to deflect toward the west or the north as the case may be.

The time-tick marks on the record sheets represent the beginning of each minute, and are numbered on the margin at intervals, 15, 20, 25, etc. Very perfect time-marking appliances are employed with the Weather Bureau seismographs, and the variation of the errors in the marks thruout the entire day covered by the record does not exceed two or three-tenths of a second. The corresponding tick marks on the two sheets are perfectly simultaneous.

By comparison with the Naval Observatory time signals it has been found that the tick marks on the record sheets are four seconds slow; that is to say four seconds must be *added* to the sheet time to obtain mean time of the seventy-fifth meridian west.

With these explanations of the record in mind we observe that the initial motion of the pier, if a displacement, must have been to the northeast, as if a wave of compression were advancing from the southwest and pushing the pier to the northeast.[2] The amount of the displacement, however, was relatively small (a few hundredths of a millimeter) and was soon succeeded by a much greater movement of the pier to the southwest; followed, in turn, by further oscillations northeastward and southwestward. The crests and hollows of simultaneous, or nearly simultaneous, excursions of the pier have been numbered in the two diagrams, 1, 2, 3, etc. The nominal scale of magnification of the two records is nearly the same, but we can not attach much significance, quantitatively, to the *amplitudes* of the waves. As already stated, the north-south instrument was on this date more strongly damped by friction than its companion instrument, in consequence of which the effect is very much the same as if the scales of magnification were greatly different.

A fair interpretation of the records does not controvert a conclusion that the amplitudes of the east-west and north-south components of motion were about equal, especially thruout the first preliminary tremors.

The times of about sixty-seven wave crests and hollows during the first and second preliminary tremors, representing an interval of about twelve minutes, have been carefully measured off from the records and are tabulated in Table 2.

[2] The vertical component of linear motion was not recorded and is not here considered. If the wave motion was propagated directly along the chord from the origin, the angle of emergence at Washington would be only about 15° whence we should expect only a small vertical component.

Table 2.—*Times of crests and hollows of waves of first and second preliminary tremors.*[3]

Wave No.	E.-W.			Difference.	N.-S.			Difference.	Remarks.
	h.	*m.*	*s.*	*Sec.*	*h.*	*m.*	*s.*	*Sec.*	
1	1	14	23	......	1	14	21	......	Crest of first preliminary tremor.
2			34	11			32	11	
3			43	9			41	9	
4			53	10			53	12	
5			62	9			67	14	
6			81	19			79	12	
7			90	9			87	8	
8			99	9			95	8	Ripples begin.
9			117	18			117	22	
10			131	14			131	14	
11			....	......			....	......	Interval of partial rest with ripples.
12	1	18	0	......	1	17	58	......	Waves Nos. 12 to 23 are almost wholly absent in the N.-S. component.
13			11	11	1	18	11	13	
14			21	10			17	6	
15			30	9			31	·14	
16			41	11			40	9	
17			51	10			47	7	
18	1	19	2	11	1	19	2	15	
19			11	9			11	9	
20			16	5			17	6	
21			21	5			20	3	
22			24	3			23	3	
23			29	5			28	5	Beginning of second preliminary tremor well defined.
24			39	10			37	9	
25			47	8			42	5	
26	1	20	0	13			56	14	
27			7	7	1	20	7	11	
28			21	14			25	18	
29			27	6			30	5	
30			40	13			34	4	
31			52	12			37	3	
32			57	5			42	5	
33	1	21	3	6			47	5	
34			7	4			50	3	
35			13	6			53	3	
36			24	11			59	6	
37			31	7	1	21	7	8	
38			40	9			20	13	
39			44	4			34	14	
40			51	7			43	9	
41	1	22	3	12			49	6	
42			20	17	1	22	3	14	
43			30	10			12	9	
44			38	8			21	9	
45			45	7			30	9	
46			56	11			40	10	
47	1	23	3	7			50	10	
48			13	10	1	23	0	10	
49			20	7			3	3	
50			30	10			15	12	
51			41	11			22	7	
52			55	14			53	31	
53	1	24	4	9	1	24	9	16	
54			25	21			26	17	
55			35	10			39	13	
56			51	16			52	13	
57	1	25	0	9	1	25	2	10	
58			17	17			15	13	
59			25	8			30	15	
60			42	17			45	15	
61			....	......			49	4	
62			...	.....	1	26	0	11	
63			....	......			4	4	
64			....	......			11	7	
65			....	......			19	8	
66			....	......			36	17	
67			....	......			55	19	Beginning of principal portion.

The agreement in times of the wave crests and hollows is noticeably close thruout the first five minutes, as also in the first waves constituting the second preliminary tremors. But discordance soon develops, (at No. 28) and the records can not be said to admit of any very definite interpretation.

There is a noticeable tendency for the wave periods to become longer toward the end of the second preliminary tremors.

From a consideration of all the facts at our command in this connection, we may be warranted in making the following statements in regard to the real nature of the motion of the seismograph pier at the time of registration of the preliminary tremors of the earthquake in question.

1. That all the waves of the first preliminary tremors appear to have produced vibrations of the pier north-east and south-west, and that the first initial motion was a very small motion toward the northeast, followed by a considerably larger displacement to the southwest, and again to the northeast, with a distinct subsidence after one or two complete waves of all motion, except of very small amplitude.

2. That after an interval of about a minute and a half, a series of ripples, or waves of small amplitude and period prevailed for nearly two minutes, followed by much slower waves of small amplitude, just preceding the arrival of the second preliminary tremors.

3. That the second preliminary tremors appear to be exactly the same in character as the first preliminary tremors, except stronger; that is to have caused the pier to move first slightly to the northeast, then much more to the southwest; again to the northeast, and so on. Here, again, the motion distinctly subsides, relatively, but the records indicate more complex motion, and I think we are warranted in assuming that the original longitudinal vibrations northeast and southwest are becoming complicated, possibly with transverse vibrations.

Altho the records are very clearly defined and inscribed, yet the smallness of the time scale, and the inherent defects of seismographic action render it impossible to arrive at any definite further interpretation of the records.

These relatively negative and incomplete conclusions emphasize the necessity for still further development of seismic apparatus. The records in the present case seem practically perfect. In the originals the smallest details are perfectly clear and definite. The difficulty arises from the failure of the steady mass to remain at rest. The relation between its motion and that of the ground is complicated and unknown. Mathematical analysis of the problem enables us to formulate certain analytical relations between the motion of the steady mass and that of the ground, but at the best these necessarily involve certain assumptions as to the ground motion, the damping of the pendulum, etc., that are not justified in nature.

In actual practise it is difficult to realize a sufficiently long period for the steady mass and to render it truly aperiodic under a strictly exponential law.

In the opinion of the writer these are the objects to be striven for in the further development of seismographs.

[3] The times are taken directly from the record sheet. A correction of four seconds must be added to obtain true seventy-fifth meridian time.

NEW JAPANESE SEISMOLOGICAL PUBLICATIONS.

By C. F. Marvin, Professor of Meteorology. Dated May 22, 1907.

The Imperial Earthquake Investigation Committee of Japan has been a very large contributor to modern seismology and its literature, and the so-called "Publications of the Earthquake Investigation Committee in Foreign Languages" are consulted by all seismologists thruout the world. The committee has very recently issued the first and second numbers of a new series of publications entitled: "Bulletin of the Imperial Earthquake Investigation Committee".

The following quotation from the preface of Vol. I, No. 1, dated January, 1907, explains the object and scope of the Bulletin:

> The object in issuing the Bulletin is to secure quick publication of short notes and preliminary reports on seismological subjects, more especially such contributions as may be of use in connection with the works of the International Seismological Association. The Publications which contain more lengthy papers will be issued from time to time as heretofore.

Numbers 1 and 2 of the Bulletin before us contains a collection of short notes by Doctor Omori treating of individual topics concerning one or more of the recent great earthquakes. In fact, it seems appropriate to give here the titles of the several notes, as follows:

"On the estimation of the time of the occurrence at the origin of a distant earthquake from the duration of the first preliminary tremor observed at any place".

"On the methods of calculating the velocities of earthquake propagation".

"Preliminary note on the cause of the San Francisco earthquake of April 18, 1906".

"Preliminary note on the seismographic observations of the San Francisco earthquake of April 18, 1906".

"Note on the transit velocities of the Guatemala earthquake of April 19, 1902".

"The Calabrian earthquake of September 8, 1905, observed in Tokyo".

"Preliminary note on the Formosa earthquake of March 17, 1906".

"Comparison of the faults in the three earthquakes of Mino-Owari, Formosa, and San Francisco".

"Note on the transit velocity of the Formosa earthquake of April 14, 1906".

"Notes on the Valparaiso and Aleutian earthquakes of August 17, 1906".

"On the distribution of recent Japan earthquakes".

In the several papers treating of the transit velocities of earthquake waves and formulas for computing times of earthquakes at the origin, etc., Doctor Omori to a certain extent revises results of earlier studies on similar topics already set forth in the Publications. The revision is based on new data and observations supplied by the recent great earthquakes in India, Calabria, Formosa, North America, and South America, and, naturally, the results differ appreciably from previous determinations.

We wish to call attention to a factor in connection with this question of speed of propagation that appears to have been generally disregarded, and is not recognized in Doctor Omori's studies.

The point in question is best illustrated by reference to the California earthquake, in respect to which certain definite facts bearing on the question are brought out from reports that have been rendered. It appears that fully thirty to thirty-five seconds elapsed after the first slight tremors were felt by careful observers located within a few miles of the fault line before the occurrence of the strong and destructive motion. Making all reasonable allowance for the existence of slight preliminary tremors for a short period corresponding to the short distance of the observers in question from the fault line, the writer is forced to the conclusion that the seismic action at the fault line during the first thirty or more seconds was of relatively inconsequential intensity. If the earthquake had ended at this phase no great records would ever have been made at distant stations, such as Tokyo, Washington, and those thruout Europe. In other words the distant records are to be correlated not with the feeble beginnings of the seismic action, as observed near the fault line, but with the strong and destructive motion. Upon this basis the waves which first reached distant stations like Washington and Tokyo originated at the fault line at the time of the beginning of *the destructive motion*, and not at the time of the motions felt first. According to the best information in the possession of the writer this time was 5 h., 12 m., 33 s., one hundred and twentieth meridian time.

Doctor Omori places the time of beginning of the earthquake at the fault line at 5 h., 12 m., 0 s. Evidence is not at hand to show that action was appreciably earlier at one part of the fault line than the other. It appears to have been nearly simultaneous at all points.

Different earthquakes must differ greatly in regard to the sequence of relative intensities thruout the entire duration of the tectonic action at the origin, and it seems that if the facts are carefully determined in each case and considered in accordance with the foregoing statements, some of the existing discordance in transit times and speeds might be harmonized.

TORNADO OF APRIL 5, 1907, IN ESCAMBIA COUNTY, FLA.

By Wm. F. Reed, jr., Observer. Dated Pensacola, Fla., May 8, 1907.

The morning weather map of April 5 showed an area of low barometric pressure over southern Arkansas, with a central depression of 29.65 inches; this storm moved eastward, with general rains, and past over northern Alabama during the afternoon of the 5th, reaching western North Carolina on the morning of the 6th.

The conditions at Pensacola on April 5 were stormy; the temperature ranged between 66° and 73°; the barometer (sea-level) fell from 29.96 at 12:01 a. m. to 29.68 at 7 p. m., and began to rise at 8:15 p. m.; winds were fresh to brisk southerly in the morning, high south to southwest between 12 noon and 9 p. m., and brisk southwest to west 9 p. m. to 12 midnight; at 3:33 p. m. the wind reached 43 miles from the south; at 5:28 p. m., 44 miles southwest; at 6:23 p. m., 45 miles southwest, and at 7:17 p. m., 40 miles southwest: clouds were of the lower types thruout the day and moved from the west and southwest; it became very threatening many times in the afternoon and evening, with passing light showers; cloudiness alternated rapidly from clear to cloudy between 7 and 9 p. m., becoming permanently clear by 9:30 p. m.; lightning was seen in the north at intervals from 6:30 to 7 p. m., then flashed from northwest around to southeast, continuing in the southeast after 11:30 p. m.; thunder was noted in the northwest at 9 p. m. The tide at Pensacola, caused by the high southerly winds, was 18 inches above normal high water. The estimated damage from this storm in Pensacola was $1000, viz, the amount that it cost the timber merchants to gather the timber that was cast ashore. Southwest storm warnings were displayed early in the afternoon.

Mr. J. H. Patterson, of Muscogee, Fla., gives the following account and exact track of the tornado as it coursed thru the woodland, deviating somewhat to the right or left of a straight line:

> The storm crost the line of Florida and Alabama in section 6, township 3 north, range 33 west, traveled southeast, past along the line between sections 6 and 31, in township 4 north, range 33 west, on thru the south half of 32 and north half of 33, southeast quarter of 28, center of section 27, north quarter of section 26; demolished house of Mr. George Locke in northeast quarter of section 26 about 5:45 p. m., past thru south half of section 24; in township 4, range 32, it went thru north half of section 19, on thru northwest quarter of section 20; in southwest quarter of section 17 it demolished a house belonging to Mr. James Lambert three or four minutes after it struck the Locke house; next it struck Mr. Steward's place and I can not give its track from there. The cloud was funnel shaped and lookt like smoke mixt with steam; no lightning; no rain. It sounded like a heavy freight train and traveled generally southwest to northeast. The presence of a whirl was evidenced by the position of fallen trees, those in the center of the path lying southwest to northeast; on the south side, northwest to southeast, and on the north side, southeast to northwest; width of path, 900 feet.

The following was obtained from an interview with Mr. J. R. Steward:

> The day was cloudy and unusually windy; aside from this there was no marked indication of anything more than an ordinary rainstorm approaching until late in the afternoon, when conditions grew threatening; and a few minutes before 6 p. m. a sound like two or three passenger trains was heard roaring with increasing fury from the west. In the house with me there were seven other men whom I had employed to work about the place. We lookt to the westward and beheld the storm approaching; it seemed as tho a dense black smoke was rolling toward us over the ground; and as it came closer I saw in this dense mass dimly outlined the funnel-shaped cloud, the tail of which seemed to be thrashing, plowing, and upsetting everything in its pathway. Upon the impulse of the moment we all realized that we were in a dangerous position and ran for our lives, but while we were running the storm was upon us. I made for the open, knowing that not far away there was a pit where possibly I would escape injury by allowing the storm to pass over me. While in the act of climbing the fence a gust of wind picked me up and carried me about fifty feet; while I was being carried a piece of flying débris struck me on the top of the head, cutting a gash in my scalp three inches long and knocking me senseless; and when picked up I was told that I was raised ten feet or more from the ground. Two of the men got under a log wagon, which was carried along some distance, and escaped injury. The men that did not cling to trees or posts were carried about by the wind. One man was carried a distance of 200 yards, receiving only slight bruises. A carpenter clung to a mulberry tree at the corner of a two-story barn (indicated on accompanying map, fig. 1, at *b*); the barn with the exception of the sills was blown away; the carpenter, altho pinned to the ground by the tree and timbers, on top of

which was the horse, was taken out with only slight injuries; the horse was badly injured.

The eight-room cottage that we occupied before the storm (indicated on map at *a*) was partially wrecked and the roof was taken off. At *c* a one-story barn was blown away. At *d* another one-story barn was destroyed. At *e* a heavy log corncrib was blown down. At *f*, about one mile to the westward, a box car, remodeled to live in, was torn to pieces; Mr. Lambert and family left the car just before the storm struck. About three miles southwest of my place a four-room cottage occupied by Mr. George Locke (indicated on map at *g*) was partially destroyed; the family of seven left the house for the open at the beginning of the storm; one of the children was blown away from the party against a fence and severely injured. Fortunately my family were away. The average width of this storm's track was about 200 yards, being about one-third of a mile wide at point of greatest destruction. For half a mile to the east of my cottage and the same distance west, even the earth was torn up along a path averaging 30 feet in width; chunks of grass were wedged between the wreckage, and the path resembled the effects one would naturally expect from a huge stream of water more than 25 feet in diameter directed along the ground with great force, instead of from wind. The rainfall attending the storm was only moderate, starting with large scattered drops just before the storm struck. One mile or so to the northward there was some hail and roads were washt by excessive rains. The course of the storm was west-southwest to east-northeast; I traced it to the eastward and find that it past about one mile south of Bluff Springs. There was very little lightning and only moderate thunder.

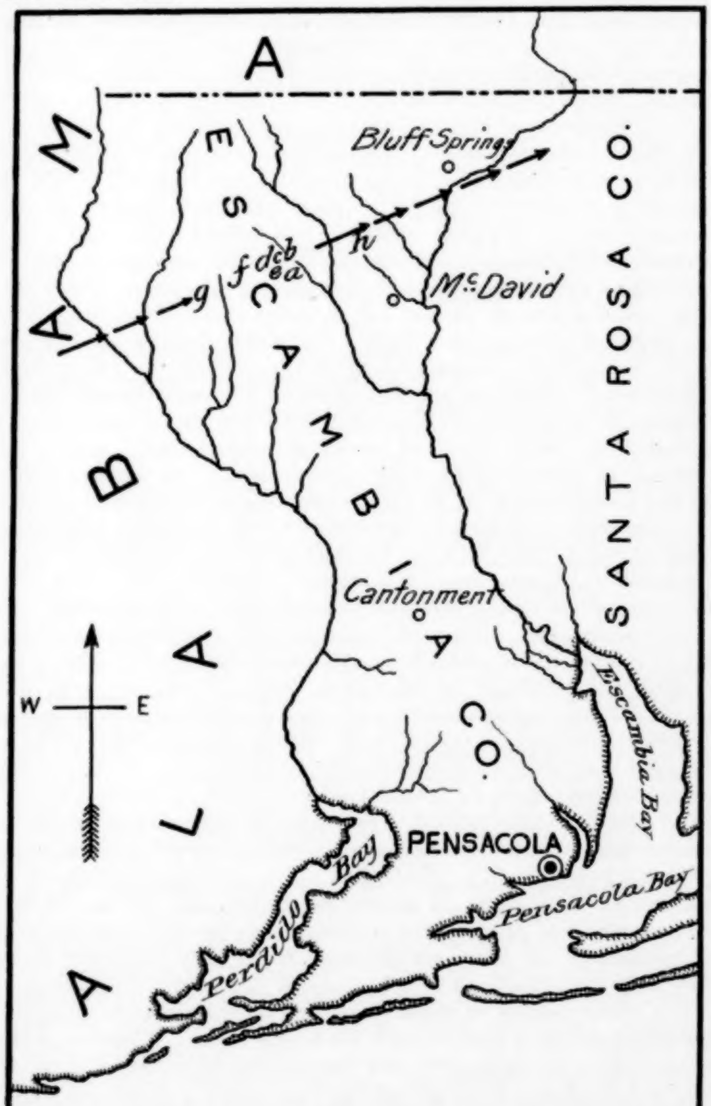


FIG. 1.—Map of Escambia County, in western Florida, showing track of tornado of April 5, 1907.

A report from Mr. J. P. Harrison, McDavid, Fla., states that the tornado late in the afternoon of the 5th past mostly thru the timber region northwest of McDavid, destroying a house belonging to Mrs. Mollie Evans and Mrs. Margarette Williams (indicated on map at *h*).

Cloud very bright, followed by heavy black cloud resembling heavy black smoke, continually mixing and rolling together. Very little lightning. Heavy rain. No hail. Previous to the storm there was a roaring, deadening sound.

Escambia County, Fla., has been visited by three tornadoes since March 1, 1905, not to mention the hurricane of September 26–27, 1906. A tornado occurred March 20, 1905, near Bluff Springs; a smaller one near Cantonment April 14, 1905, and the one of this April (1907) also past near Bluff Springs.

A PROPOSED NEW METHOD OF WEATHER FORECASTING BY ANALYSIS OF ATMOSPHERIC CONDITIONS INTO WAVES OF DIFFERENT LENGTHS.

By HENRY HELM CLAYTON. Dated Hyde Park, Mass., May 4, 1907.

It has been known for a long time that when an average of the temperature, pressure, or any weather condition is obtained for a week, month, or other period, the resulting mean will differ for successive intervals, even after allowance has been made for the known annual and diurnal variations. By many meteorologists it is still considered debatable whether these variations are merely unbalanced, accidental variations, subject to no law, or whether they represent variations under the rule of forces which may be ascertained, and predictions of the variations may be made. I believe that such laws can be found, and I have spent many years in a laborious search for them.

In the American Meteorological Journal of July, 1885, and again in the same journal of June, 1891, I quoted data which seem to me to show clearly that, in the oscillations of pressure and temperature in the United States, there may be detected at least two sets of waves, one of which travels rapidly from west to east and the other much more slowly. Chambers and Sherman had also pointed to evidence of a similar nature.[1] But, so far as known, the drift of atmospheric conditions, other than that apparent on the ordinary weather map, was sporadic and irregular, sometimes being relatively rapid and at other times very slow, and therefore furnished no basis for accurate forecasting. Moreover, such movements are so disguised that they are not readily recognized, and have received but little attention.

Meteorologists have turned their attention to other aspects of the subject, such as (1) periodic changes; (2) the shifting of the centers of action of the atmosphere, as, for example, the shifting of the center of high pressure near the Azores, or the shifting of the center of low pressure near Iceland; (3) seesaw oscillations of pressure and other weather conditions between widely separated areas, as between India and Russia, or India and South America, or between Iceland and the Azores.

After considerable research along these lines,[2] I have arrived at the conclusion that, for purposes of forecasting, the study of the laws underlying the drift of weather conditions is the most promising line of research, and that the conditions of high and low pressure, temperature departures, etc., shown on the weather map, should not be regarded as individual units, each having a drift of its own, but rather as a complex, kaleidoscopic effect, produced by atmospheric conditions progressing from place to place at different speeds and, perhaps, from different directions. When one turns a kaleidoscope, the bits of glass, moving different distances, fall into a new arrangement; so, in the course of a day, the different atmospheric conditions, changing or moving with different speeds, assume the momentary relations which are shown by successive daily weather maps. Figs. 1, 2, 3, and 4 are given here

[1] Nature, vol. 23, Nos. 4 and 5, and Amer. Meteor. Journal, vol. 1, No. 7.

[2] See paper showing oscillation about certain centers in Amer. Meteor. Journal, Jan., 1884, and April, 1885, and also various papers on periodic changes in same journal.

to show that the ordinary changes in temperature and pressure may be analyzed into different classes, distinguished by different rates of change, and that each class is dependent on some atmospheric condition moving from place to place with a velocity peculiar to that particular class and different from that of every other class. These examples were selected at random. Fig. 1 is reproduced from an earlier paper in the American Meteorological Journal, vol. 8, p. 65, June, 1891. In this figure the vertical lines represent differences in time of five days, between January 1 and February 9, 1888, and the horizontal lines show differences in temperature of 10° F. The unbroken curves show the normal temperature at four stations in the United States, namely: Fort Assinniboine, Mont., latitude 48° 32′ N., longitude 109° 42′ W.; Yankton, S. Dak., latitude 42° 54′ N., longitude 97° 28 W.; Marquette, Mich., latitude 46° 39′ N., longitude 87° 24′ W., and Eastport, Maine, latitude 44° 54′ F., longitude 66° 59′ W. The dotted curves show plots of the current temperatures observed at these same stations between January 1 and February 9, 1888.

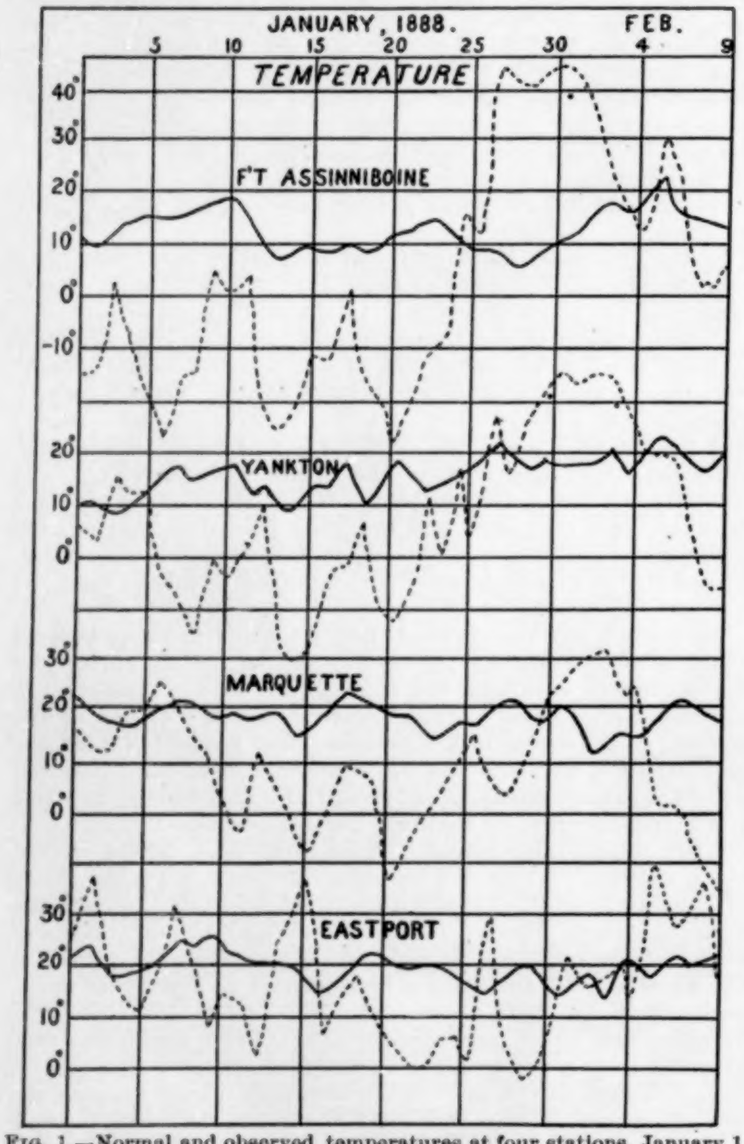


FIG. 1.—Normal and observed temperatures at four stations, January 1 to February 9, 1888.

At each of these stations, the curves show that, besides the minor fluctuations from day to day, there was a prolonged period when the temperature was below the normal, followed by a period when the temperature was above the normal. The prolonged period of abnormal cold began at Fort Assinniboine on December 25, and the greatest departure below the normal occurred on January 6. It began at Yankton on January 5, and the greatest departure from the normal occurred on January 14. It began at Marquette on January 7, and the greatest departure occurred on January 20. It began at Eastport on January 16, and the greatest departure occurred on January 29. This period of cold was followed by a shorter period of abnormal warmth which occurred about ten days later at Eastport than at Assinniboine, indicating a velocity somewhat over one thousand miles a week. This is more rapid than the movement of the preceding area of cold, but still much slower than the warm waves accompanying our usual winter storms, which move nearly one thousand miles a day. These storm waves are shown by the more rapid fluctuations in the dotted curve of fig. 1, which are found at Eastport only three to four days later than at Fort Assinniboine.

Fig. 2 is plotted from observations of pressure, from January 1 to February 9, 1901, at Williston, N. Dak. (latitude 48° 9′ N., longitude 103° 35′ W.), Duluth, Minn. (latitude 46° 47′ N., longitude 92° 6′ W.), Chicago, Ill. (latitude 41° 33′ N., longitude 87° 37′ W.), and Boston, Mass. (latitude 42° 21′ N., longitude 71° 4′ W.). In this plot, vertical lines represent differences of one day, and horizontal lines, differences of one-tenth of an inch of pressure. The continuous curves show the observed fluctuation of pressure at the various stations from January 1 to February 9, 1901.

The curves show that the maxima and minima of pressure indicated by the numerals 1, 2, 3, etc., moved very rapidly from west to east, taking about three days to move from Williston to Boston. If, however, smooth curves, like those shown by the broken lines, be drawn thru these rapid fluctuations and the maxima and minima are marked *A*, *B*, *C*, etc., there is evidence that, underlying these rapid fluctuations of pressure, there are slower oscillations or waves, which move more slowly than the ones marked with the numerals. For example, the time taken for the maxima and minima marked *A*, *B*, *C*, etc., to move from Williston to Boston is about five days. This time is nearly twice as great as that required for the more rapid fluctuations marked 1, 2, 3, etc., to traverse the same distance. Again, by drawing a dotted curve thru the mean points between the maxima and minima, *A*, *B*, *C*, etc., there are shown still longer oscillations of pressure which travel much more slowly than either of the sets of fluctuations marked 1, 2, 3, or *A*, *B*, *C*, etc.

By reading the values of the curve *A*, *B*, *C*, etc., from the plot for each twelve hours and subtracting them from the observed values, the shorter fluctuations are separated from the longer and may be plotted separately, as in fig. 3. Then by plotting the readings of the curve *A*, *B*, *C*, etc., fig. 4 is obtained. Thru the maxima and minima of this curve is drawn a broken curve which shows the longer, slow-moving oscillation or wave, the minimum of which occurs about ten days later at Boston than at Williston.

To analyze such curves graphically is, however, more or less arbitrary, and different sets of curves would be drawn by different persons from the same data. Another method of analysis is by means of numerical averages. If, as in the present series of curves, the interval between the maxima and the minima of the more rapid fluctuations is two to three days, these may be smoothed out by taking the numerical mean of all the observations of three days and doing this successively, beginning at each observation for a new mean. The resulting means, when plotted, give curves like those marked *A*, *B*, *C*, etc., in figs. 2 and 4. The maxima in these curves are separated by intervals of from five to seven days. Using the values from which the curves *A*, *B*, *C*, etc., are plotted and taking means for successive intervals of six days the oscillations *A*, *B*, *C*, etc., are smoothed out, and there result numbers from which a plot like that shown on the broken curve in fig. 4 is derived. By subtracting the smoothed values for three days

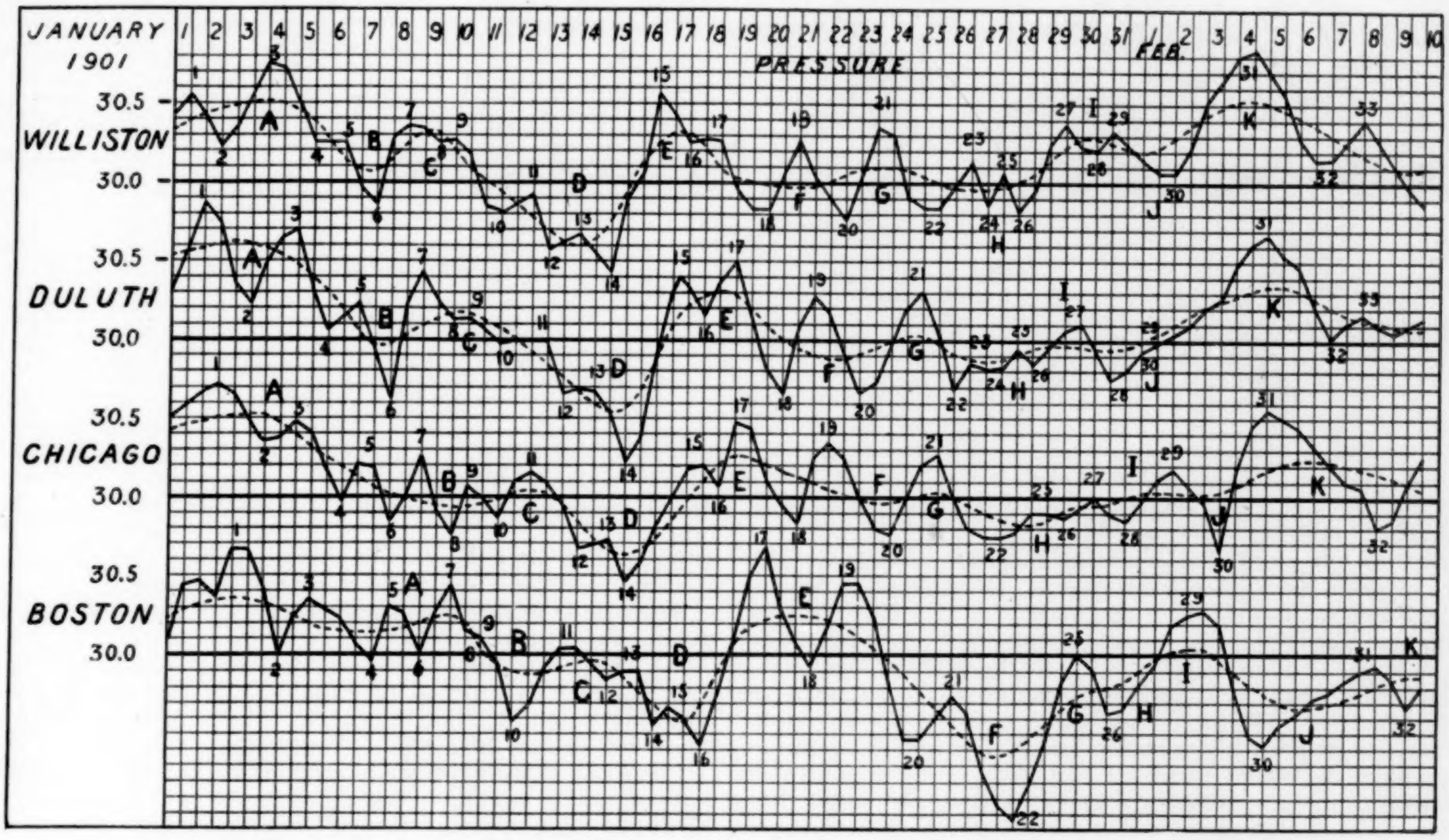


Fig. 2.—Pressure at four stations, showing observed pressure and a smooth curve, January 1 to February 9, 1901.

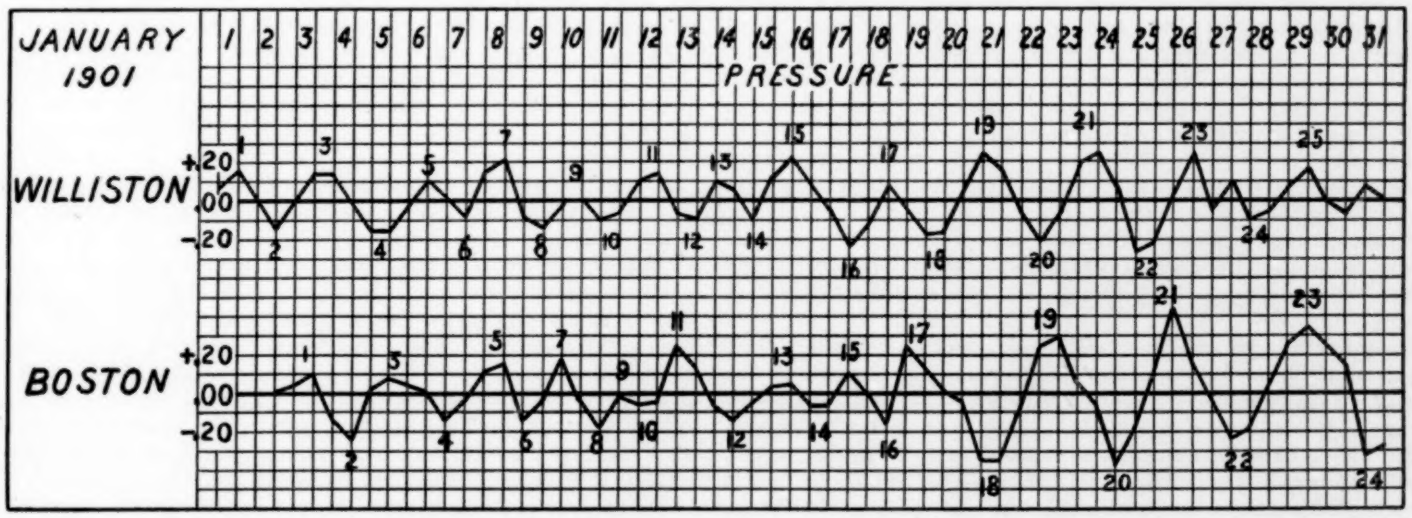


Fig. 3.—Departures of observed pressure at two stations from smooth curve values, showing shorter fluctuations, January, 1901.

from the observed values, the oscillations marked 1, 2, 3, etc., may be separated from longer oscillations; then, by subtracting the means of six days from the means of three days, these oscillations may be separated from those of longer periods, and so on successively.

Analyses of the observed values of temperature at 13 widely separated stations in the United States were carried out consecutively for the three years 1897, 1898, and 1899. The selected stations were Boston, Mass., Hatteras, N. C., Key West, Fla., Buffalo, N. Y., Chicago, Ill., Little Rock, Ark., Galveston, Texas, Williston, N. Dak., Denver, Colo., El Paso, Texas, Salt Lake City, Utah, Seattle, Wash., Los Angeles, Cal.

23——2

This work, finished as long ago as 1901, disclosed the fact that this complex set of waves occurs continuously and travels across the United States in a general west to east direction, each wave moving with a velocity and direction of its own, the velocity being in general inversely as the wave-length measured in time—that is, short waves move rapidly and longer waves more and more slowly, in proportion to their length. The diagrams, figs. 5 to 28, Plates I, II, and III, are given to illustrate the progressive motion of the three classes of waves shown in figs. 3 and 4. In preparing these charts the observed temperature data were separated into different classes of waves in the manner described above, and for the 13 stations named. The rapid fluctuations, such as those marked 1, 2, 3, etc., in

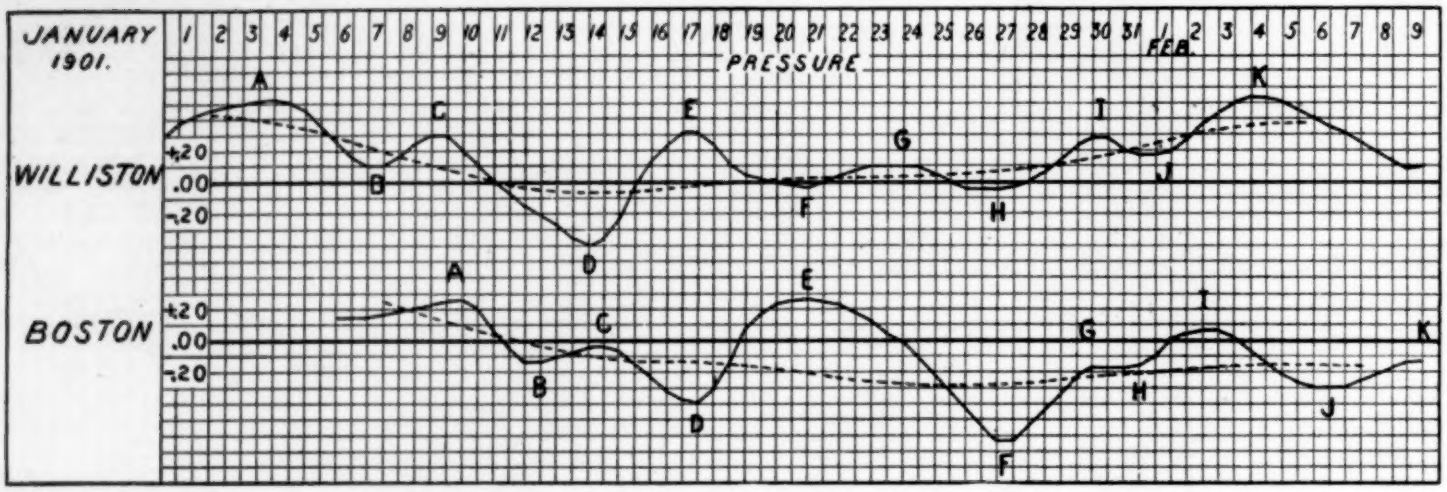


Fig. 4.—Smooth curve values of pressure at two stations, showing longer fluctuations, January 1 to February 9, 1901.

figs. 2 and 3, where the crests of successive waves are only two or three days apart, were charted for successive days in figs. 5 to 12, Plate I. The residuals obtained after eliminating the other classes of waves were used for this purpose and lines of equal values were drawn. In this and the succeeding charts, the mean values and equal values above the mean are connected by continuous lines, while equal values below the mean are connected by broken lines. The charts for successive days show that waves of this class move from west to east very rapidly and cross the United States in about three days. The diagrams, figs. 13 to 20, Plate II, show the progressive movement of a class of waves like those marked *A*, *B*, *C*, etc., in figs. 2 and 4. The crests of these waves are five to nine days apart, and the progressive movement is so much slower than the movement of the waves of Class I that about six days are occupied in crossing the United States. The diagrams, figs. 21 to 28, Plate III, show the progressive movement of waves of a class indicated by the broken curve in fig. 4, in which the crests of the wave are about a month apart. Waves of this class move so much more slowly than the preceding waves that the diagrams are given for successive intervals separated by four days instead of one day.

Meteorological waves of this class take from nine to sixteen days in crossing the United States, and their arrival on the eastern coast may be predicted for more than a week in advance.

There are longer waves which travel even more slowly than do waves of Class III, but the progressive movement of the longest waves is more or less complicated by oscillations about centers and can not be followed so easily as the shorter waves.

The waves of different classes not only move from place to place with a velocity different for each class, but occasionally move from directions at right angles to one another. That is, a wave of one class moving from the southwest may exist simultaneously with waves of another class moving from the northwest, and the condition may last for several weeks.

It seems to me that these facts prove the separate, physical existence of such waves.

When lengths of oscillation, or the times from crest to crest of successive waves are taken as ordinates, and rates of travel from place to place are taken as abscissas, a plot of the observed data shows a flat curve of the nature of a parabola.

The results of this investigation have led me to the following important conclusions:

(1) That every meteorological element at any given place may be analyzed into a definite number of oscillations or waves differing in length, each of which appears to have a physical existence distinct from that of the others.

(2) When analyzed in the same way, for any given time, the data at widely separated stations near the same latitude show analogous waves, except that the maxima and minima differ somewhat in the time of occurrence at the different stations.

(3) The waves, at least in temperate latitudes, drift generally from west to east—that is, the maxima and minima occur at eastern stations later than at western stations.

(4) The velocity of drift is inversely proportional to the wave length. Fluctuations, or oscillations, completed in a short period of time drift rapidly, while longer fluctuations drift more and more slowly in proportion as the time of oscillation is longer.

(5) The speed of travel appears to be fairly constant from year to year for waves of the same length of oscillation measured in time.

The discovery of these facts not merely opens the way to a great improvement in the forecasting of weather from day to day, but also, I believe, furnishes a scientific basis for long-range forecasting. The application of this knowledge to practical work is, however, not easy because of the difficulty of analyzing and separating the different classes of waves. As a result of working at the matter for a number of years and carefully developing and testing methods of analysis and charting, I believe it is possible to improve the present forecasts and to make forecasts longer in advance, which would be of enormous advantage to agriculture and commerce.

I have employed at different times to assist me in this work Mr. John P. Fox and Miss M. L. Davenport. Their patient industry and various suggestions have enabled me to accomplish the large amount of work necessary to develop and test the conclusions presented here. I am indebted to Prof. H. S. Mackintosh for a revision of the manuscript.

Plate I. Progressive Movement of Temperature Waves of Class I, February 23 to March 2, 1899.

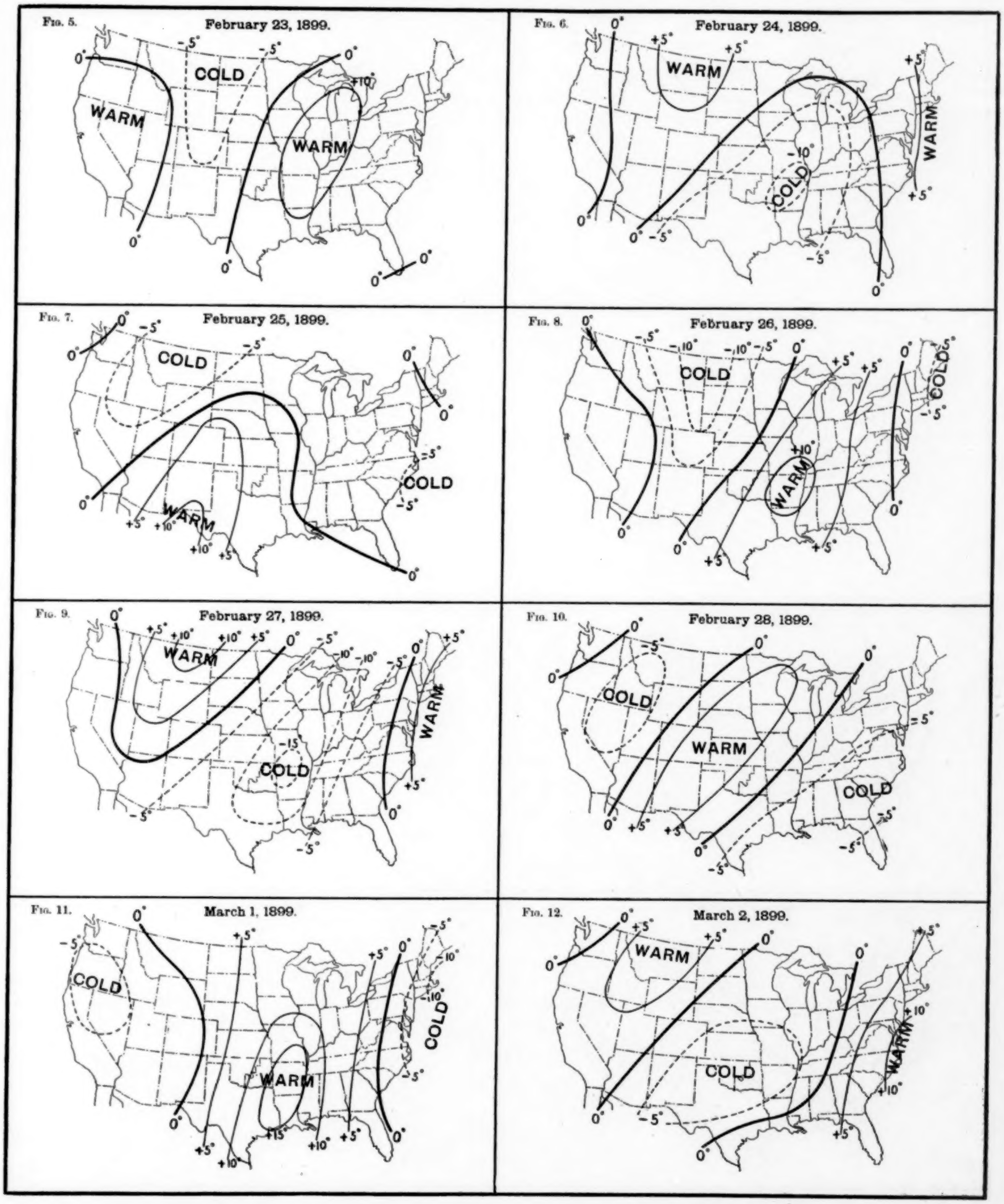


Plate II. Progressive Movement of Temperature Waves of Class II, February 25 to March 4, 1899.

FIG. 13. February 25, 1899.

FIG. 14. February 26, 1899.

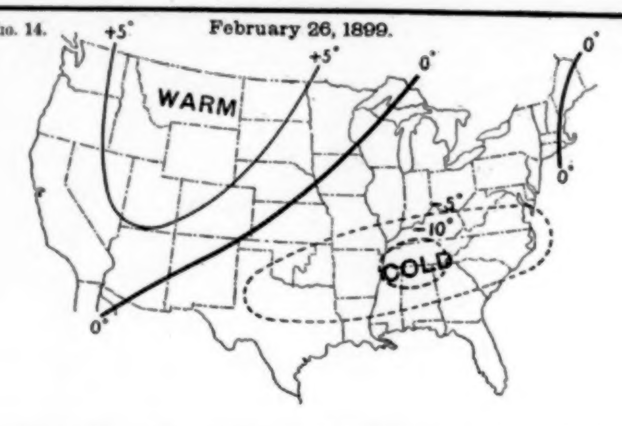


FIG. 15. February 27, 1899.

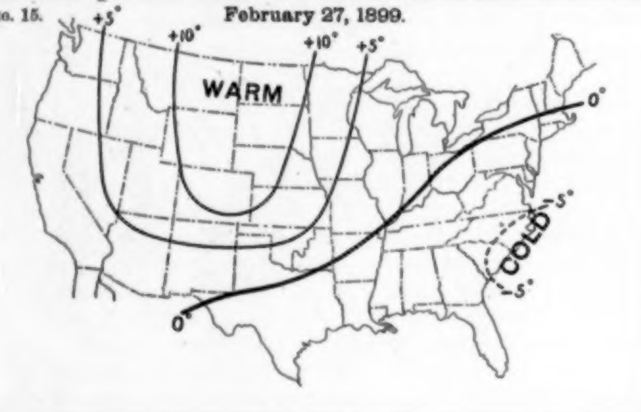


FIG. 16. February 28, 1899.

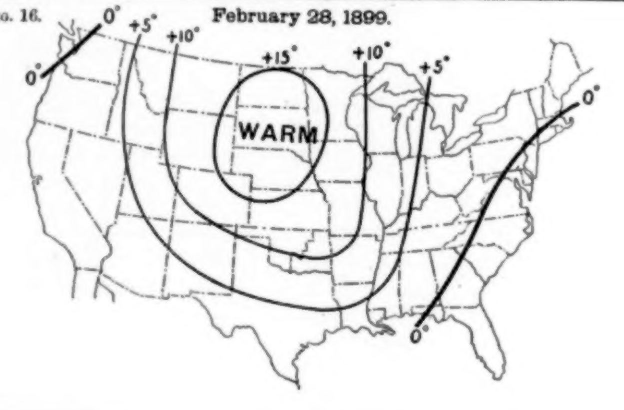


FIG. 17. March 1, 1899.

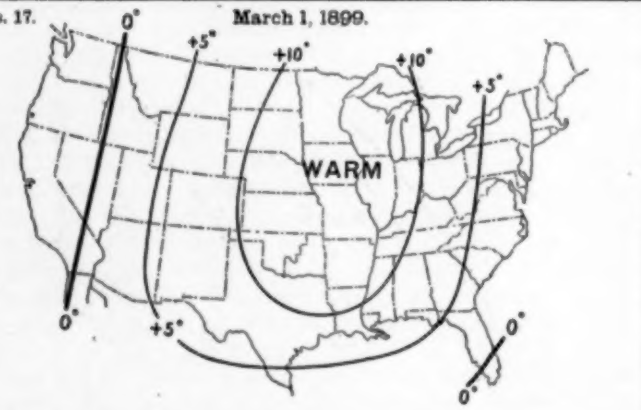


FIG. 18. March 2, 1899.

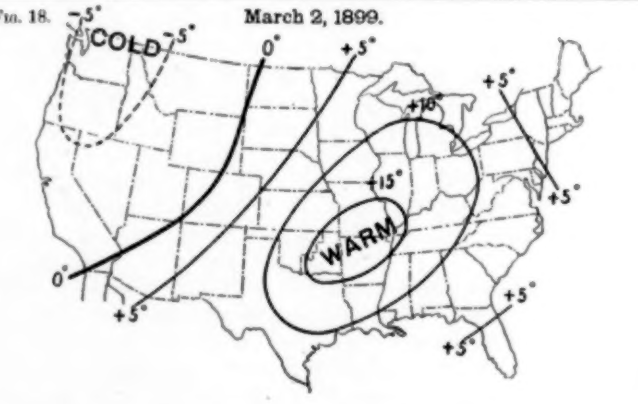


FIG. 19. March 3, 1899.

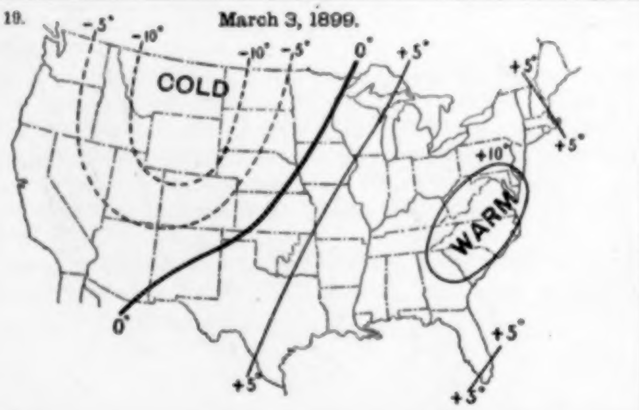


FIG. 20. March 4, 1899.

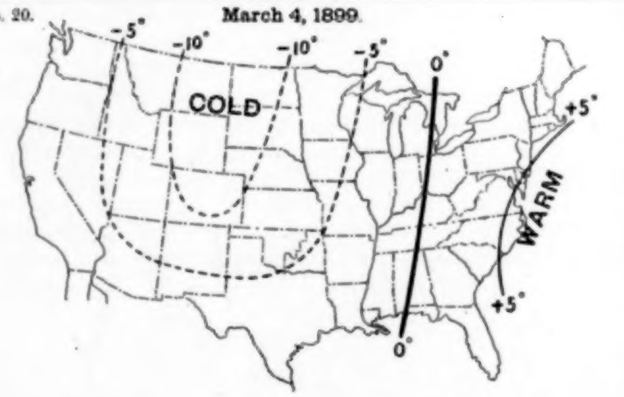


Plate III. Progressive Movement of Temperature Waves of Class III, February 2 to March 2, 1899 (4-day intervals).

Fig. 21. February 2, 1899.

Fig. 22. February 6, 1899.

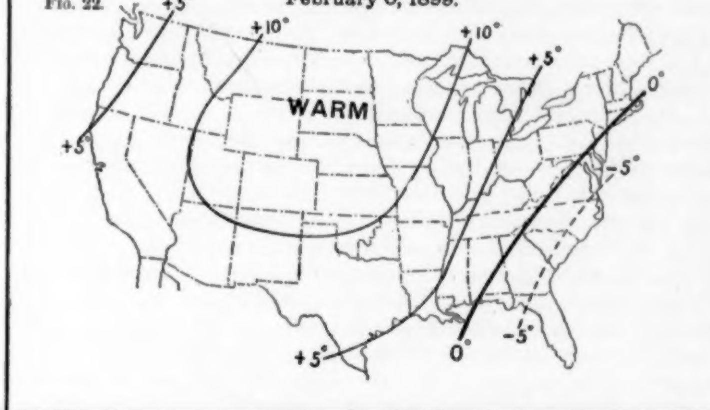


Fig. 23. February 10, 1899.

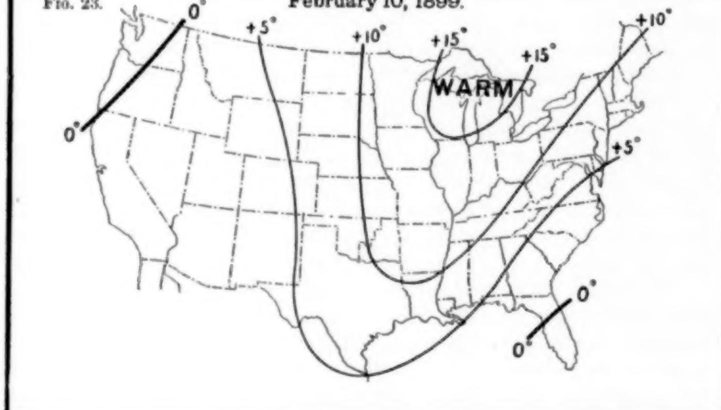


Fig. 24. February 14, 1899.

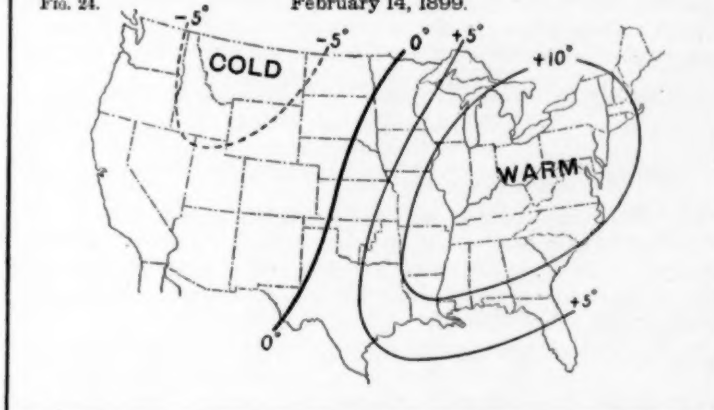


Fig. 25. February 18, 1899.

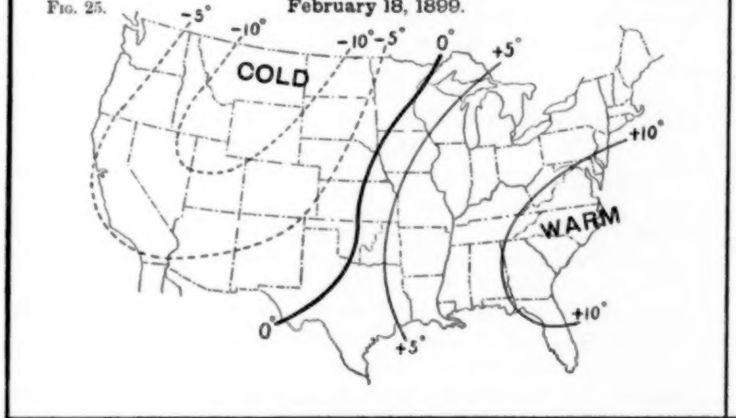


Fig. 26. February 22, 1899.

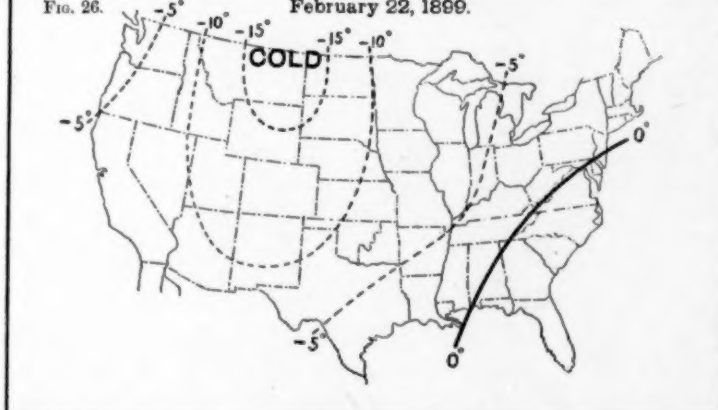


Fig. 27. February 26, 1899.

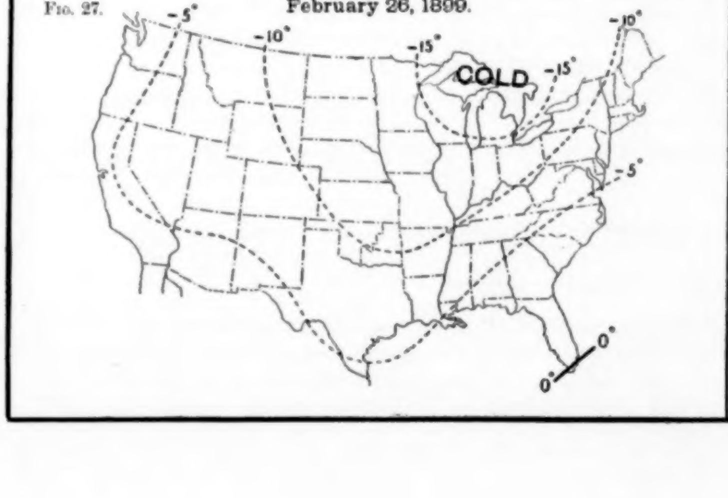
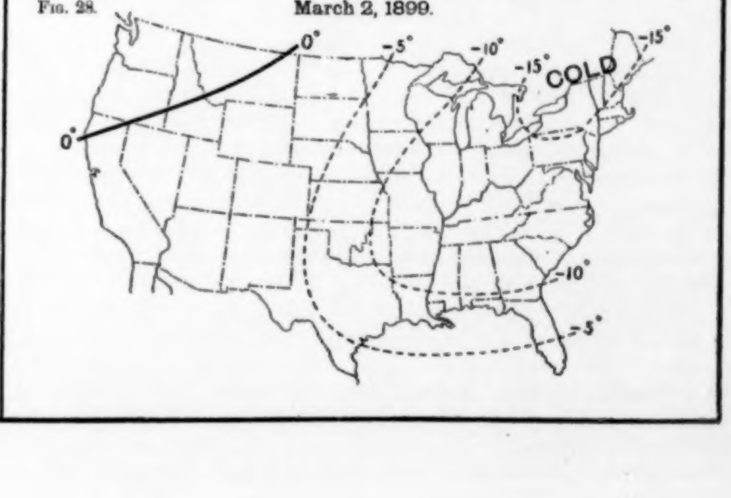


Fig. 28. March 2, 1899.



METEOROLOGY IN THE PHYSICAL LABORATORY.

It is well known that for many years the Editor has endeavored to stimulate the study of dynamic meteorology as a combination of laboratory methods with analytical mechanics. A man familiar with hydrodynamics and thermodynamics should be able to make their application to the atmosphere a most interesting subject, and eventually build up a school of mathematical physics applied to meteorology that will be as important to the university as it will be to the advancement of the science.

The following article, by Brunhes, illustrates the class of work to be done in such a laboratory; and many similar examples of careful experimentation could be adduced. At the Peoria convention the Editor sketched out the plan of a work entitled "A handbook of laboratory work leading up to research in meteorology", in which, by a well graded series of experiments, the student proceeds, step by step, until he has explored the prominent feature of atmospheric phenomena, comparing his measurements with his theories until he has obtained a clear idea of the processes that are going on in nature.—*C. A.*

ACTION OF A HORIZONTAL AIR CURRENT UPON A VERTICAL WHIRLWIND.

By Bernhard Brunhes.

[Translated by Chester L. Mills from the Comptes Rendus of the Academy of Sciences, Paris, April 29, 1907. Vol. CXLIV, p. 900.]

I have been conducting an experimental research as to the mechanical action exerted by a horizontal air current upon a whirlwind with a vertical axis susceptible of lateral displacement. I have recognized that the phenomenon follows the following law:

A horizontal current exerts on a movable vertical whirlwind that has a sinistrorsal rotation, a horizontal force perpendicular to the current and directed to the left; the force is directed toward the right of the current if the motion of the whirlwind is dextrorsal.

1. I have had recourse to the apparatus of Weyher for the production of a vertical whirling column of air. A vertical box 140 centimeters high and 50 centimeters on a side has three vertical wooden sides, the fourth being of glass before which the observer places himself. At the top is fixt a revolving drum which may be rotated in either direction at will by a small motor. The vertical whirling column is rendered visible by a white smoke of ammonium chlor-hydrate, produced by placing on the floor of the box an evaporating dish full of [hydrochloric] acid in the middle of a vessel of ammonia.

Against a given point of the vertical column of smoke is directed a jet of air generated by an electric fan and carried to the center of the box by a horizontal bent glass tube, which is terminated by a branch, *A*, perpendicular to the glass front of the box and ending a few centimeters from the axis. With a sinistrorsal (counterclockwise) whirling column, the observer standing before the glass front sees the column deviate to his left at the height of the tube *A*; and, continuing to inflect itself and to oscillate, it maintains itself at the right of the tube *A*, if the jet of air is strong enough.

2. A second tube, *B*, exactly in the line of the prolongation of *A*, opens opposite the orifice of *A*, conducting the air which escapes from it from the rear to the front. A stopcock allows the air from the fan to enter by either *A* or *B*, as desired. When the direction of the whirling column is sinistrorsal, the revolving column is deflected to the left if the air enters by *A*, but to the right if the air enters by *B*. With a dextrorsal rotation of the whirling column, the result is reversed, altho it is proper to remark that a column of smoke with dextrorsal rotation is produced and maintained less easily than one with sinistrorsal rotation.

The interior diameter of the tubes *A* and *B* being 8 millimeters, and the speed of the drum one thousand revolutions per minute, for a current of air 30 meters per second, blowing upon the vertical column 65 centimeters from the bottom, there is produced a mean displacement of 15 to 25 millimeters when we pass from tube *A* to tube *B*.

3. I endeavored to check these results by manometric measurements, with a pressure receiver (*prise de pression*) which made it possible to explore the hydrodynamic field of the whirling column and its neighborhood. This pressure receiver is the end of a small horizontal tube, *T*, bent vertically, and capable of being displaced in two directions, forward and backward, and from right to left. The glass tube is connected by a rubber tube to a water manometer with an inclined arm, giving about 1 centimeter displacement for a variation in pressure of 1 millimeter of water.

On moving the tube *T* a minimum of pressure is found to correspond to the case where the vertical arm of the small tube is in the axis of the whirling column. If a horizontal jet of air is directed from *A* or *B* on the vertical arm of the tube *T*, being careful always to blow a little below the opening, so as not to exert, by means of the jet, a direct influence on the free end, it is observed that the manometer rises a little whether one blows from the front or from the back. Again, to find the minimum of pressure it is necessary to push in or draw out the tube *T* so that its extremity will be a little to the left of its initial position (8 to 10 millimeters) if one blows from front to back thru *A*, and when the whirling column is sinistrorsal; but, on the contrary, to the right if one blows from back to front thru *B*.

When the exploring tube *T* is placed in a position such that its extremity is 8 millimeters to the left of the position of minimum pressure without the air jet, there is clearly an increase in pressure (from 0.3 to 0.5 millimeters) when the stopcock is manipulated so as to substitute the rear jet for the one in front. The reverse is the case (with the sinistrorsal whirling column in every case) if the end of the exploring tube is placed 8 to 10 millimeters to the right of the initial position of minimum pressure.

CHARACTERISTICS OF THE INTERTROPICAL ATMOSPHERIC CIRCULATION.[1]

[Translated by Chester L. Mills from the Comptes Rendus of the Academy of Sciences, Paris, April 8, 1907.]

Last year we presented to the academy the results obtained during the first two cruises of the *Otaria*. Since that time the discussion of the observations on the second voyage, of 1906, has been brought to a conclusion, which enables us to state with precision some of the characteristics of the circulation of the air in the intertropical region of the Atlantic.

The north to east trade winds ordinarily extend to an altitude of only several hundred meters. In this stratum the decrease in temperature is very rapid, as one may judge from the following figures which result from ascensions of kites and sounding balloons:

Decrease in temperature per 100 meters of ascent.

Position.	0 to 200	200 to 400	400 to 600	600 to 800	800 to 1000	1000 to 1100	1100 to 1200	1200 to 1400	Method.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	
To the north of parallel 25° N.	1.3	1.0	0.6	0.35	0.4	0.1	0.8	.....	Kites.
To the south of parallel 25° N.	+1.8	+0.9	+0.3	−0.75	−0.5	0.0	−1.0	+0.7	Kites.

Six sounding balloons (mean latitude 30° N.) gave a diminution of 1.8° C. for the first 500 meters, with the minimum rate of diminution of temperature at about 1250 meters.

Six sounding balloons at the equator (mean latitude 1° N.)

[1] Note by Messrs. L. Teisserenc de Bort and A. L. Rotch, presented by M. Mascart.

gave a diminution of 1.2° C. for the first 500 meters, with an inversion of the rate at the mean altitude of 1000 meters.

Above the stratum of rapid diminution comes a zone where the wind diminishes in force, and in which the temperature ordinarily presents inversions. Moreover, this phenomenon has already been observed by M. Hergesell for the region between the Azores, Madeira, and the parallel of 26° N., but it is general in its character, and is found again in the northern intertropical zone and in the southeast trade wind of the Southern Hemisphere, which has been studied as far as the Island of Ascension.

Apropos of this inversion, whose cause is not yet established, we call attention to the fact that Biot in his memoir "On the true constitution of the terrestrial atmosphere", published in 1841 in the Connaissance des Temps, when discussing the observations of Humboldt in the equatorial region of the Cordilleras, represented the variation of temperature with altitude by a parabola whose summit, located at an altitude of about 800 meters, corresponded to an inversion of temperature: this latter, moreover, was deduced only from calculations without having been observed directly. The observations made on the *Otaria* fully justify the view held by this celebrated physicist.

Above the northeast trade winds are ordinarily observed currents from different directions; the greater part of the time these come from the northwest, but may alternate with other winds. Going still higher, we find those currents with southerly components that constitute the antitrade winds; these currents begin at a low altitude in the region of the equator, where they are found on an average below 2000 meters, while at the Tropics they are met with at about 2500 meters, and again in the latitude of Teneriffe several hundred meters higher.

As we have already pointed out, the antitrade wind as a whole indicates clearly the effect of the earth's rotation; it is first from the southeast, then becomes south, and next southwest; it ends as a west wind in the latitude of the Azores.

The region of ascending air near the equator is occupied by winds in which the easterly component predominates at the various altitudes that have been explored, namely, from the level of the sea up to 14 kilometers.

In the neighborhood of Ascension we find again above the southeast trades the winds of the southern antitrades, having northerly components, with several intercalated strata moving from the southwest, corresponding to the northwest winds of our hemisphere.

To the north of the Tropic [of Cancer] the regularity of the trades and antitrades diminishes. In these parts it sometimes happens that the trade wind extends to an altitude of 6 to 8 kilometers, the antitrade having been deflected to the right or to the left, but these conditions are transitory.

North of latitude 25° N. one finds that in summer the trades and antitrades predominate from the neighborhood of the Canaries to about longitude 37° W. On going farther toward America the south and southwest winds become predominant in the lower strata, a fact that is fully explained by the distribution of isobars, which are themselves determined by the course of the isotherms.

THE VELOCITY OF CENTERS OF HIGH AND LOW PRESSURE IN THE UNITED STATES.

By C. F. VON HERRMANN, Section Director. Dated Baltimore, Md., May 9, 1907.

The fact that the general motions of the atmosphere have a controlling influence upon the direction of motion and velocity of cyclones was recognized by Espy as early as 1841.[1] Ferrel, in 1859, suggested that the upper currents carry them along as a stream of water carries along the whirling eddies which we find in it.[2] We are indebted, however, to Loomis for the classical investigation of the velocity of storms in the United States.[3] Loomis found the average velocities from the weather maps for thirteen years, 1872 to 1884, and his results have been quoted quite generally in books on meteorology.[4]

The publication of Mr. Edward H. Bowie's new method of ascertaining the direction and velocity of single depressions gives new importance to the accurate determination of the mean rate of speed of storms as observed under different conditions in the past, and suggested the idea of recalculating the average velocities of highs and lows in the United States from the material supplied by the MONTHLY WEATHER REVIEWS. From 1878 to March, 1904, the latitude of origin and of disappearance, the length of path and velocities of high and low pressure areas have been published regularly, and the task of assembling the data for the entire period of twenty-six years was not a difficult one.

The results are given in Table 1, mean velocities and number of areas of low pressure in the United States, 1878–1904 (miles per hour). A comparison with the averages obtained by Loomis for the period 1872 to 1884 shows substantial agreement.

Velocity of storms, Loomis, 1872–1884.

Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
33.8	34.2	31.5	27.5	25.5	24.4	24.6	22.6	24.7	27.6	29.9	33.4	28.4

Weather Bureau records, 1878–1904.

Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
34.8	34.8	31.6	26.9	24.3	24.0	24.4	24.6	24.8	27.4	30.7	34.9	28.6

The average annual velocity from the Weather Bureau records is slightly higher than the earlier averages found. The only marked discrepancy occurs in August; the longer period does not show so marked a minimum velocity in that month as we find in Loomis's records. The minimum occurs in June. On the whole the mean velocities are very nearly equal during the 3 winter months, averaging about 35 miles an hour. There follows a brief transitional period when the velocity diminishes (March and April). During the 5 months from May to September, inclusive, the velocity does not vary widely from the mean of 24.4 miles. Again during October and November there is a transitional period with increasing velocities.

The general eastward motion of the atmosphere increases gradually upward from the earth's surface. Ferrel calculated that the eastward movement in the upper atmosphere is about 26 miles an hour at an elevation of 2.5 miles,[5] but Professor Bigelow in his International Cloud Report states that the maximum development of cyclones takes place at an elevation of from 3 to 4 miles, where the progressive motion of the air must be considerably greater, in fact agreeing closely with the speed of whirlwinds at the surface. The difference between the summer and winter velocities is quite marked; the ratio of the means during the two seasons is in round numbers 24 to 35, or nearly 1 to 1.5.

[1] Espy: Philosophy of Storms, 1841.

[2] Motion of Fluids and Solids relative to the Earth's Surface, 1859, as mentioned in Ferrel's Treatise on Winds, page 275.

[3] Contributions to Meteorology, Elias Loomis, 1886.

[4] The policy adopted by Gen. A. J. Myer was to confine the meteorological work of the Signal Service to observations and forecasts and the collection of data for the use of those professional meteorologists outside the Government service who were endeavoring to improve the science, properly so called. Therefore the Signal Service published little or nothing relating to theoretical meteorology during his administration, altho numerous studies were in progress as unofficial work. With regard to the movement of areas of high and low pressure reference may be made to the tables for 1872 and 1873, given at pages 154–159 of Part II of the Annual Report of the Chief Signal Officer, 1889, and especially to the tables by Professor Garriott contained in Bulletin A, "Summary of International Meteorological Observations", Washington, 1893.—*C. A.*

[5] Ferrel's Treatise on Winds, page 277.

TABLE 1.—*Mean velocities and total number of centers of areas of low pressure in the United States for each month, 1878 to 1904.*

Year.	January.		February.		March.		April.		May.		June.		July.		August.		September.		October.		November.		December.		Annual.	
	Velocity.	No.	Velocity.	No.	Velocity.	No.	Velocity.	No.	Velocity.	No.	Velocity.	No.	Velocity.	No.	Velocity.	No.	Velocity.	No.	Velocity.	No.	Velocity.	No.	Velocity	No.	Velocity.	No.
	M. p. h.		*M. p. h.*		*M. p. h.*		*M. p. h.*		*M. p. h.*		*M. p. h.*		*M. p. h.*		*M. p. h.*		*M. p. h.*		*M. p. h.*		*M. p. h.*		*M. p. h.*		*M. p. h.*	
1878	26.3	11	28.9	8	24.3	10	15.3	6	16.9	7	15.7	6	21.7	7	26.8	6	21.3	10	18.5	11	21.2	6	34.0	6	22.6	94
1879	35.5	8	33.3	6	35.1	13	30.0	13	25.3	6	29.4	9	....	6	21.0	6	21.7	7	30.8	5	40.7	12	38.8	12	31.1	103
1880	30.4	14	39.6	14	35.7	14	27.2	9	25.1	7	24.5	8	25.7	6	26.1	10	22.5	11	22.0	12	34.1	9	42.8	9	29.6	123
1881	32.3	9	45.3	9	26.8	9	37.1	7	32.6	5	36.1	8	32.4	5	25.4	5	30.7	6	43.5	6	30.6	15	33.6	10	33.9	94
1882	42.6	13	43.2	11	34.8	10	29.5	11	21.6	4	26.8	7	19.8	6	19.0	10	23.5	4	28.5	13	27.7	5	30.2	10	28.9	104
1883	39.8	15	36.4	10	38.0	11	26.8	9	30.0	9	24.2	9	31.4	8	28.0	6	25.0	10	37.3	9	39.4	9	33.0	15	32.4	121
1884	42.5	17	47.4	15	33.3	13	20.7	9	26.8	10	19.1	6	22.4	12	30.7	11	33.6	16	34.4	14	35.2	9	48.1	8	32.8	140
1885	37.8	11	40.5	11	36.0	9	24.8	8	24.4	7	26.5	7	26.4	9	22.0	7	23.5	7	26.8	9	24.4	8	31.5	10	28.7	103
1886	36.7	10	32.2	13	31.0	14	19.7	6	24.8	11	23.8	10	19.2	12	34.0	12	27.5	11	26.0	9	25.2	14	31.4	11	27.6	133
1887	37.0	15	34.4	9	31.0	11	31.1	13	18.0	10	24.9	10	22.6	7	31.4	8	22.8	11	27.9	11	33.0	14	29.0	11	28.6	130
1888	39.4	10	33.2	9	34.5	9	35.9	9	26.8	10	24.6	12	25.8	8	22.7	6	24.2	9	25.4	13	34.1	7	33.5	8	30.0	110
1889	40.4	11	34.9	10	25.8	10	25.6	13	21.2	9	23.4	10	22.1	14	24.0	6	21.7	10	27.4	12	30.5	11	42.0	15	28.2	131
1890	40.0	12	37.0	15	37.0	12	37.0	10	31.0	12	18.0	9	22.0	9	24.0	10	24.0	9	25.0	13	36.0	13	39.0	15	30.8	139
1891	27.0	12	34.0	14	28.0	13	25.0	8	22.0	8	22.0	10	23.0	8	21.0	11	27.0	12	29.0	10	29.0	15	38.0	15	27.1	136
1892	32.0	13	34.0	9	29.0	13	30.0	8	28.0	11	28.0	11	30.0	11	25.0	8	26.0	10	27.0	10	31.0	16	35.0	11	29.6	131
1893	36.0	18	40.0	12	37.0	12	33.0	8	30.0	12	23.0	10	26.0	7	19.9	9	21.2	11	25.0	15	30.3	15	36.1	14	29.8	143
1894	33.0	16	35.3	15	31.0	16	20.3	14	20.0	10	19.0	17	17.0	11	19.6	16	20.0	11	19.0	15	27.4	17	28.6	17	24.2	175
1895	28.7	15	25.6	17	29.5	18	26.7	14	21.8	8	19.4	4	21.6	11	22.3	17	24.3	9	25.9	15	34.2	10	31.3	14	25.9	152
1896	25.7	9	29.6	14	27.9	10	23.6	9	21.1	10	24.1	8	23.6	11	27.6	10	25.1	11	24.4	9	33.8	8	31.8	12	26.5	121
1897	29.1	9	31.3	11	27.7	12	23.3	8	20.6	11	24.4	9	19.5	8	22.0	9	25.5	10	26.7	12	27.7	8	32.4	12	25.8	119
1898	36.6	12	27.2	8	29.1	10	25.3	7	19.4	9	24.3	10	27.3	6	21.2	8	22.6	8	24.5	8	27.8	14	28.4	9	26.1	109
1899	35.2	14	33.3	9	30.2	11	25.0	8	23.6	9	24.0	6	20.9	7	16.7	9	27.9	10	25.3	10	25.9	10	36.5	16	27.0	119
1900	37.0	14	37.3	15	35.6	14	23.1	13	30.3	9	22.1	9	29.2	12	26.0	9	24.5	11	26.0	17	27.8	17	34.8	16	29.5	156
1901	33.1	20	31.7	15	26.4	14	26.7	10	23.1	9	24.1	11	22.1	7	28.2	6	25.9	8	28.4	14	28.6	16	36.2	11	27.9	141
1902	33.7	11	31.5	7	29.7	10	27.8	11	28.2	9	27.7	10	31.1	7	28.5	8	26.6	11	28.7	8	28.2	11	32.9	9	29.6	110
1903	35.7	12	31.8	7	32.8	6	29.9	10	20.1	7	24.6	9	27.0	7	25.8	7	26.1	7	29.5	9	35.5	12	39.3	11	29.8	104
1904	36.0	13	31.5	13	34.8	9	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Mean	34.8	12.8	34.8	11.3	31.6	11.6	26.9	9.7	24.3	8.7	24.0	9.0	24.4	8.6	24.6	8.8	24.8	9.6	27.4	11.1	30.7	11.6	34.9	11.8	28.6	125
Highest maximum velocities of individual lows	67.9	....	81.0	....	57.4	....	68.8	....	54.7	....	52.0	....	50.0	....	55.0	....	50.0	....	65.0	...	55.0	....	79.0	....	....	....
Means of all the monthly maximum velocities for 26 years (1878-'903)	51.4	....	52.8	....	45.6	....	40.2	....	35.2	....	34.3	....	37.3	....	35.1	....	37.4	....	39.2	....	43.9	....	53.2	..	42.1	....
Lowest minimum velocities of individual lows	4.2	....	8.3	....	6.5	....	8.0	....	7.0	....	7.0	....	8.0	....	4.2	....	4.0	....	4.0	....	4.3	....	6.3	....	....	....
Means of all the monthly minimum velocities for 26 years (1878-1903)	18.7	....	21.0	....	18.2	....	17.1	....	13.6	....	14.6	....	14.6	....	14.2	....	12.3	....	15.2	....	17.7	...	20.1	....	16.4	....

Total number of storms, 3276.

TABLE 2.—*Mean velocities and total number of centers of areas of high pressure in the United States for each month, 1888 to 1904.*

Year.	January.		February.		March.		April.		May.		June.		July.		August.		September.		October.		November.		December.		Annual.	
	Velocity.	No.	Velocity.	No.	Velocity.	No.	Velocity.	No.	Velocity.	No.	Velocity.	No.	Velocity.	No.	Velocity.	No.	Velocity.	No.	Velocity.	No.	Velocity.	No.	Velocity.	No.	Velocity.	No.
	M. p. h.		*M. p. h.*		*M. p. h.*		*M. p. h.*		*M. p. h.*		*M. p. h.*		*M. p. h.*		*M. p. h.*		*M. p. h.*		*M. p. h.*		*M. p. h.*		*M. p. h.*		*M. p. h.*	
1888	....	....	....	....	27.6	6	34.3	9	22.0	6	21.2	6	19.7	8	25.8	5	21.1	8	25.4	10	25.7	6	18.3	6	....	....
1889	17.6	7	24.8	7	27.7	8	21.5	8	18.1	7	22.0	6	17.0	7	16.5	6	22.9	9	20.7	10	26.0	7	35.0	12	22.5	94
1890	31.0	10	31.0	10	27.0	9	26.0	7	28.0	9	20.0	6	22.0	5	26.0	9	24.0	8	23.0	11	30.0	7	32.0	9	26.8	100
1891	29.0	9	30.0	6	28.0	10	26.0	8	23.0	7	19.0	6	23.0	5	26.0	7	28.0	6	23.0	10	24.0	8	28.0	12	25.6	96
1892	26.0	10	27.0	10	24.0	7	24.0	6	35.0	8	25.0	5	24.0	4	24.0	7	25.0	10	24.0	11	31.0	10	28.0	8	26.4	99
1893	30.0	14	34.0	12	29.0	9	34.0	12	31.0	7	23.0	5	27.0	5	13.5	4	22.8	7	21.0	10	23.2	6	28.2	15	26.4	106
1894	24.0	17	25.2	9	21.1	15	19.0	12	28.6	8	21.7	6	15.7	5	13.8	9	21.2	12	27.2	12	29.9	17	26.9	15	22.9	137
1895	39.4	11	25.5	12	26.7	11	22.1	10	21.8	6	24.9	4	19.5	11	18.8	14	21.6	9	25.6	11	21.0	4	20.2	3	23.9	106
1896	22.2	10	26.5	7	23.5	8	21.2	6	23.5	7	23.6	7	22.2	7	22.5	6	24.7	7	21.9	10	27.6	5	24.8	8	23.7	88
1897	27.3	6	26.1	8	25.7	6	24.0	11	19.4	7	23.7	7	20.6	4	25.2	8	21.7	9	24.7	10	25.8	7	22.9	7	23.9	88
1898	30.8	10	28.3	10	25.3	8	25.2	8	22.0	9	23.8	8	22.1	6	21.4	6	24.3	6	23.8	8	25.5	9	24.5	7	24.8	95
1899	30.8	10	27.1	6	22.7	8	19.4	6	24.9	6	22.0	7	20.4	6	24.3	6	23.5	9	23.3	6	25.2	9	30.5	9	24.5	88
1900	33.2	14	29.5	13	30.4	13	26.9	8	28.9	7	27.9	5	23.9	9	22.0	6	25.3	10	27.0	8	29.8	11	27.3	14	27.7	118
1901	33.5	10	28.8	9	26.6	7	28.7	6	22.0	4	25.5	4	25.1	6	25.1	9	29.0	4	39.7	11	25.7	14	31.1	12	27.6	96
1902	35.4	8	27.2	5	31.8	6	29.0	8	24.7	8	20.9	4	20.0	5	23.8	6	32.8	9	25.8	8	32.6	10	29.9	10	20.3	87
1903	36.0	8	27.8	8	29.4	9	21.9	10	32.6	4	26.2	4	23.2	9	24.6	6	27.7	7	29.0	8	30.9	6	31.6	10	28.4	89
1904	25.4	11	32.1	11	26.7	8	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Mean	29.5	10.3	28.2	8.9	26.7	8.7	25.2	8.4	25.4	6.9	23.7	5.8	22.2	6.4	22.1	7.1	24.7	8.1	24.7	9.6	27.1	8.5	27.4	9.8	25.6	99
Highest maximum velocities of individual highs	66.7	....	50.0	....	50.0	....	50.8	....	58.0	....	57.7	...	39.0	....	41.0	....	52.1	....	52.1	...	52.4	....	66.7	....	....	....
Means of all the monthly maximum velocities of highs for 16 years	44.9	....	41.3	....	38.1	....	36.3	....	35.7	...	33.0	....	29.2	....	29.9	....	34.1	....	35.5	....	39.3	....	42.0	....	36.6	....
Lowest minimum velocities of individual highs	2.0	....	5.0	....	11.1	....	7.0	....	8.3	....	10.0	....	9.4	...	8.3	....	8.0	....	7.0	....	10.0	....	6.0	....	....	....
Means of all the monthly minimum velocities of highs for 16 years	16.2	....	15.2	....	17.0	....	16.0	....	15.5	....	17.6	....	15.8	....	15.1	....	14.9	....	15.7	....	17.1	....	14.9	....	15.9	....

Total number of highs, 1587.

The mean rate of progress of cyclone centers is much greater in the United States than over the Atlantic Ocean or in western Europe. The rates are: United States, 28.6 miles an hour, Atlantic Ocean, 18.1, and western Europe, 16.8 (Hann). The explanation is not difficult. In continental America the air contains far less moisture than it does over the Atlantic or over western Europe, and consequently the point of condensation where the maximum storm formation occurs must lie at a higher level over the broad continent. Over the oceans condensation begins at a much lower level, where the speed of the upper currents is far less, and the depressions can not be carried forward so rapidly. In winter on account of lower temperatures there is even less moisture in the air and so the region of maximum disturbance is elevated and the velocity of storms increased.

A velocity for individual depressions of 60 miles an hour or

more has been observed in the United States fifteen times during the past twenty-six years. In some cases the velocity of the spirally inflowing winds must actually be less than the progressive movement of the disturbance as a whole. This was probably true on the following occasions when the mean velocity of the cyclone center exceeded 70 miles an hour:

December 26–28, 1880, 75 miles an hour; February 1, 1881, 75 miles an hour; February 8–9, 1884, 81 miles an hour; December 21–22, 1884, 79 miles an hour; February 21, 1894, 75 miles an hour.

These are average velocities for the whole path of the storm, but the rate is never uniform, and no doubt at times the speed of these storms was even greater. Hann states that the maximum velocities known to him for Europe are—

December 16, 1869, and November 10–11, 1875, 70 miles an hour; March 12–13, 1876, at Hamburg, 76 miles an hour.

The average velocity of anticyclones is a matter of not less importance, but the values found are not so certain on account of the difficulty of fixing exactly the centers of high pressure areas. The data in the MONTHLY WEATHER REVIEW enable us to calculate the mean rate of movement for the period of only sixteen years from 1888 to 1904. The results will be found in Table 2, mean velocities and number of anticyclones in the United States, 1888–1904. The annual mean is 25.6 miles an hour, which is only 10 per cent less than the speed of cyclones. The maximum velocity is found in January, 29.5 miles, and the minimum in August, 22.1 miles. The maximum velocity of anticyclones rarely exceeds 60 miles an hour.

A COURSE IN DYNAMIC METEOROLOGY.

Dr. Arthur Schuster, the eminent professor of physics in Owen's College, Victoria University, Manchester, England, has contributed funds for the maintenance of a readership in dynamic meteorology at some university in the British Isles. The appointment to this position seems to have been intrusted to the Meteorological Committee of the Royal Society, and the first incumbent is to be Mr. Ernest Gold, M. A., Fellow of Saint John's College, and superintendent of instruments in the Meteorological Office at London. He will hold this position for three years, or until October, 1910.

Meteorology owes a debt of gratitude to Professor Schuster for the first recognition of dynamic meteorology, or the mechanics of the earth's atmosphere, as a subject worthy of special recognition by British universities. Will not some American patron of science do as much for an American university?—*C. A.*

WEIGHT OF SLEET ON TELEGRAPH WIRES AND TREES.

Mr. P. H. Smyth, Local Forecaster, sends the following extract from the daily journal of the Cairo, Ill., station, for the date January 30, 1902:

> In order to give an idea of the thickness of ice on branches of trees the following illustration is given: A twig measuring 23½ inches in length, tapering from $\frac{5}{16}$ of an inch to $\frac{1}{8}$ of an inch in diameter, and weighing $\frac{5}{8}$ of an ounce, was incased in ice weighing, when melted, 12¾ ounces, troy weight. The twig was obtained before any melting of ice had taken place.

ON THE DEPRESSION IN THE VALUE OF THE TOTAL INTENSITY OF THE SOLAR RADIATION IN 1903, ACCORDING TO MEASUREMENTS MADE AT THE CENTRAL STATION OF THE POLISH METEOROLOGICAL SERVICE AT WARSAW.

By LADISLAUS GORCZYŃSKI, D. Sc. Dated Vienna, Austria, February 8, 1907.

[Translated by Chester L. Mills.]

INTRODUCTION.

In the MONTHLY WEATHER REVIEW (Vol. XXXII, No. 3, pp. 111–112, 1904) was reproduced a note published by us in the Comptes Rendus of the Academy of Science of Paris (T. 138, 1904, pp. 225–258) on the subject of a considerable diminution in the total value of the intensity of solar radiation, determined at Warsaw by measurements made regularly since 1901 at the Central Station of the Polish Meteorological Service.

This short note, of a provisional character, necessarily requires correction and completion in order to accord with the results of five years of measurements (1901–1905); especially the numerical values formerly given for the years 1901, 1902, and 1903 at Warsaw, have been recognized as not being correctly exprest in gram-calories, because of a mistake in the old theory of the Ångström-Chwolson type of actinometer. That mistake consists, as the results recently acquired show, in the inadequacy of converting actinometric measures by means of an instrumental "constant". This source of error is very important, and we shall speak of it further on. (See section 1.)

In a work[1] recently published there are discust the results of five years' measurements (1901–1905) at Warsaw, which were definitely reduced to gram-calories, in accordance with the modified theory, by means of variable coefficients of transmission established by numerous comparisons with the electrical compensation pyrheliometer. We took advantage of that occasion to communicate, in an extract, the newly established results on the subject of the march of the solar depression at Warsaw; these results should replace those of the preceding note, published in 1904 in the MONTHLY WEATHER REVIEW.

This communication having the character of a monograph, and referring only to Warsaw, we shall occupy ourselves here neither with the literature[2] of the question nor with the important measurements which have been made in other places. We shall only recall that the diminution of solar radiation of which we shall speak was observed, independently, in Europe by M. H. Dufour and in America by Mr. H. H. Kimball. It appears now that Mr. Kimball was the first to observe the fact of the depression, altho the first notice published on the subject belongs to M. Dufour.

1. *Apparatus.*—In the following measurements at Warsaw, an actinometer of the Ångström-Chwolson type was used, which was constructed in 1893 by Prof. O. Chwolson, and described in detail in an important memoir under the title, "Actinometrische Untersuchungen zur Construction eines Actinometers und eines Pyrheliometers" (Wild's Repertorium für Meteorologie. Vol. 16, No. 5, 1893).[3] This instrument (see fig. 1, Ångström-Chwolson actinometer, type of 1893) belongs to the so-called dynamic type of actinometers; it is based on the method employed in 1887, by Prof. K. Ångström. The essential point of the latter method consists in the simultaneous measurement of the differences of temperature between two identical bodies, one of which is exposed to the sun while the other is in the shade (and vice versa).

The definitive formula for the actinometer of the Ångström-Chwolson system is of form:

$$q = K\omega \quad \ldots\ldots (1)$$

$$\text{where } K = \frac{2c}{s} \quad \ldots\ldots (2)$$

$$\omega = \frac{1}{t}\,\frac{\theta_2^2 - \theta_1\theta_3}{\theta_1 - \theta_3} \quad \ldots\ldots (3)$$

where q = the intensity of the solar radiation referred to a unit of surface exposed normally; c = the thermal capacity;

[1] Lad. Gorczyński. Sur la marche annuelle de l'intensité du rayonnement solaire à Varsovie et sur la théorie des appareils employés. 8vo., VIII, 202 pages, with 2 plates, 1906. (Wende and Co., Booksellers, Warsaw.)

[2] That literature may be found in the works of Messrs. H. H. Kimball, S. P. Langley, H. Dufour, R. Holm, etc., also in our own work of 1906, cited above.

[3] See also Weather Bureau Bulletin No. 11, pp. 721–725.

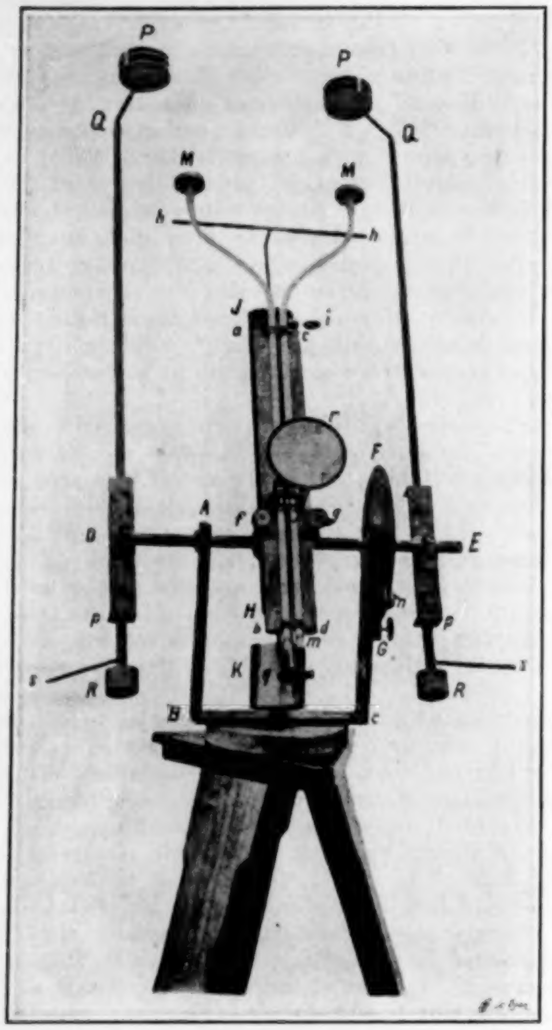


FIG. 1.—The Ångström-Chwolson actinometer, type of 1893.

s = the absorbing surface; θ_1, θ_2, θ_3, simultaneous differences of temperature of the two bodies in the equal successive intervals of time t. We shall designate by T the excess of temperature of the body over that of the surrounding medium; by h the coefficient of external thermal conductivity; by d the thickness of the glass envelop of the actinometric body; and by k the coefficient of internal thermal conductivity. The formula (1) (where, according to the old theory, K represents a "constant" for each instrument, whereas the value of ω is calculated directly for each measurement and has been considered as a relative value of the radiation) is now obtained by the integration of the differential equations:

$$qsdt = cdT + shTdt \text{ .... } (4)$$

for the case of a body warming up under the action of the sun, and

$$0 = cdT + shTdt \text{ .... } (5)$$

for the cases of a body cooling in the shade, assuming in both cases that the respective losses of heat (exprest by the last factors of the formulas) are identical for equal values of T.

This supposition, however, is not exact, if, as was done here, one takes the values of T directly from the readings of the actinometric thermometers. Knowing the complicated special structure of the actinometric bodies of the instrument in question, we ought not to identify the thermometric state of the mass of mercury with that of the blackened surfaces which absorb the solar radiation; it must not, then, be assumed that at the moment when the columns of mercury have the same positions in the two actinometric thermometers, the temperatures, and therefore the losses of heat, are at that moment equal for all parts of the apparatus, i. e., for the two bodies in general.

2. *Modified formulas and comparisons of the actinometers with the electrical compensation pyrheliometer.*—In order to modify the formulas of the old theory let us designate by ψ the difference between the temperature of the body that is being warmed and that of the mercury within, and by φ the corresponding difference for the cooling surface and that of the mercury within it:

Instead of the equations (4) and (5) we shall have

$$qsdt = cdT + sh(T + \psi)dt \text{ .... } (6)$$

and

$$0 = cdT + sh(T - \varphi)dt \text{ .... } (7)$$

For ψ and φ the following relations have been established:[4]

$$\psi = \frac{d}{k + hd} \cdot (q - hT) \text{ .... } (8)$$

$$\varphi = \frac{hd}{k + hd} \cdot T \text{ .... } (9)$$

Introducing these values in (6) and (7) we obtain:

$$qsdt = c\left(1 + h\frac{d}{k}\right) dT + shTdt \text{ .... } (10)$$

$$0 = c\left(1 + h\frac{d}{k}\right) dT + shTdt \text{ .... } (11)$$

where the values of T relate directly to the temperatures indicated by the actinometric thermometers.

The definite formulas of the modified theory may therefore be written in the form:[5]

$$q = K'\omega \text{ .... } (12)$$

where the value of ω (which is obtained directly from each actinometric measurement) is identical with that of the old theory [see formula (3)], whereas the factor

$$K' = \frac{2c}{s}\left(1 + h\frac{d}{k}\right) \text{ .... } (13)$$

no longer represents an "instrumental constant", but a coefficient of transmission varying with h. By reason of the increase of h with the temperature we may expect that the values of the coefficient K' will, in the course of the year, represent certain variations in this function of the temperature. We may consider these variations as corresponding also approximately to those of the intensity of solar radiation.

The theoretical hypotheses concerning the character and the variations of the coefficient of transmission of the actinometer of the Ångström-Chwolson type are completely confirmed by direct comparisons with the electrical compensation pyrheliometer.[6] At Warsaw during the period 1901–1905, in 78 days of observation, 1023 pyrheliometric measurements were made, and by comparing the simultaneous values given by the two instruments the following coefficients have been obtained[7] (averages arranged in groups):

(*a*) Ångström-Chwolson actinometer No. 44, 29:				
"Relative" value for this actinometer	1.02	1.15	1.25	1.32
Coefficient of transmission	0.811	0.844	0.863	0.882
(*b*) Ångström-Chwolson actinometer No. 60, 57:				
"Relative" value for this actinometer	......	1.11	1.37	1.63
Coefficient of transmission	......	0.737	0.744	0.750

The variability of the coefficient of transmission is not the same in these two cases, the values of d and k not being necessarily the same for each instrument.

[4] See the author's work above cited (1906); Chap. II, pp. 19–22; in what follows we shall designate this work by the abbreviation: G. 1906.

[5] Note that the value of h is considered as a constant during a single measurement with the actinometer of the Ångström-Chwolson type.

[6] A description of the electrical compensation pyrheliometer (with figure) may be found in the Monthly Weather Review (July, 1903, Vol. XXXI, pp. 320–334; and October, 1901, Vol. XXIX, pp. 454–458).

[7] See G., 1906, Chap. VI, pp. 89–98.

3. *Actinometric data for Warsaw and their degree of precision.*—The actinometric data obtained at Warsaw consist of 7622 measurements made during 389 days of observation (in the period 1901–1905). The instruments were installed on the upper terrace of the Central Meteorological Station, situated 25 meters above the average level of the adjacent streets; the elevation of the place of observation above the level of the sea does not exceed 130 meters.

From all the actinometric measurements we have computed 864 "definitive" values, each of which is the mean of five consecutive values converted into absolute values by means of the coefficient of transmission.

A critical discussion of the errors entering into the measurements at Warsaw[8] leads to the conclusion that the accidental errors of the "definitive" values do not, in general, exceed 1 per cent of the measured value of the solar radiation. As to the systematic error common to the whole series of measurements, it is identical with that of the pyrheliometer that was taken as a standard. As a maximum value of this latter error, according to Prof. K. Ångström, we may take 1.4 per cent.

These results show that the actinometer constructed by Prof. O. Chwolson is justly placed among the instruments of precision, and may be properly used in current measurements of the total intensity of the solar radiation.

For each value of the intensity of radiation we have calculated the corresponding elevation of the sun, likewise the absolute humidity in millimeters observed by means of the aspiration psychrometer of Assmann.

The variations (ΔQ) in the intensity of radiation with the angular altitude of the sun (h) at Warsaw have been found to be as follows:[9]

h	ΔQ	h	ΔQ
9°–12°	0.119	25°–30°	0.066
12°–15°	0.093	30°–35°	0.061
15°–20°	0.108	35°–45°	0.074
20°–25°	0.087	45°–55°	0.054

We observe that these variations, which have been utilized for the reduction to the [adopted standard] height of the sun at Warsaw, correspond to the analogous variations found for Treurenberg (in Spitzbergen), for Zakopane (in Galicia, Austrian Poland), and for Guimar (on the Island of Teneriffe).

4. *Annual summaries of the measurements of the intensity of solar radiation at Warsaw.*—In approaching the question of the diminution in the intensity of the solar radiation in 1903, we must first of all tabulate the summaries for the five consecutive years of the period 1901–1905, as follows:

In Table 1 are given, in consecutive columns, separately for each year, the following:

1. Year and month (in Roman numerals I–XII).
2. Mean monthly values of Q, calculated from tables *in extenso* [10].
3. Elevation (h) of the sun at the middle of each month, at Warsaw.

TABLE 1.—*Annual summaries, Warsaw, 1901–1905.*

1	2	3	4	5	6	7	
Year and month.	Monthly mean. Q	h	Q 30°; mean distance.	n	f	Monthly Max. Q	Date.
1901.		°					
I	0.820	17	1.001	4	3.9	0.881	27
II	1.132	25	1.172	6	2.2	1.242	12
III	1.083	36	1.010	5	4.8	1.139	31
IV	1.225	47	1.089	7	5.7	1.320	8
V	1.209	56	1.043	16	7.5	1.346	2
VI	1.185	61	1.014	7	13.3	1.294	14
VII	1.188	59	1.025	12	11.3	1.269	4
VIII	1.120	51	0.978	8	12.4	1.259	11
IX	1.158	41	1.058	9	9.5	1.241	25
X	1.076	29	1.082	6	8.7	1.199	22
XI	1.002	20	1.129	2	3.6	1.049	10
XII	0.944	15	1.167	3	5.6	0.975	6
Mean	....	....	1.052	85	8.3	....	.....
1902.							
I	0.826	17	1.009	3	4.0	0.859	25
II	1.014	25	1.060	5	3.2	1.134	22
III	1.169	36	1.093	4	4.2	1.324	13
IV	1.182	47	1.046	5	4.4	1.278	21
V	1.098	56	0.933	6	6.4	1.155	24
VI	1.114	61	0.940	7	7.6	1.177	4
VII	1.177	59	1.011	7	8.2	1.328	29
VIII	1.110	51	0.965	8	9.3	1.269	23
IX	1.171	41	1.071	6	7.3	1.367	20
X	0.997	29	1.003	4	4.4	1.125	5
XI	0.845	20	0.976	8	3.0	0.942	19
XII	0.661	15	0.894	5	1.9	0.722	8
Mean	....	....	0.994	68	5.7	....	.....
1903.							
I	0.729	17	0.909	2	1.8	0.744	14
II	0.800	25	0.850	5	3.9	0.838	15
III	0.919	36	0.849	6	6.1	0.977	3
IV	1.005	47	0.869	1	5.5	1.005	22
V	0.964	56	0.793	5	7.9	1.011	22
VI	1.140	61	0.967	2	9.5	1.187	30
VII	1.023	59	0.852	3	10.6	1.144	28
VIII	0.988	51	0.839	3	12.0	0.998	22
IX	0.981	41	0.885	8	8.9	1.011	19
X	0.890	29	0.898	5	7.4	1.017	27
XI	....	20	....	....	....	....	.....
XII	(0.480)	15	0.716	1	2.1	....	.....
Mean	....	....	0.862	41	7.3	....	.....
1904.							
I	0.640	17	0.825	5	2.4	0.715	1
II	0.750	25	0.800	4	4.3	0.917	23
III	1.171	36	1.094	7	2.5	1.256	4
IV	1.155	47	1.020	4	5.5	1.210	29
V	1.136	56	0.975	12	5.9	1.321	21
VI	1.094	61	0.919	14	6.8	1.190	13
VII	1.122	59	0.956	8	7.6	1.313	13
VIII	1.108	51	0.963	8	8.4	1.193	29
IX	1.146	41	1.050	12	7.0	1.238	13
X	0.985	29	0.993	4	6.7	1.150	24
XI	0.975	20	1.104	2	3.0	1.006	16
XII	0.772	15	1.003	2	2.4	0.796	28
Mean	....	....	0.968	82	6.9	....	.....
1905.							
I	0.833	17	1.013	7	2.0	0.937	18
II	1.123	25	1.161	1	2.7	1.123	5
III	1.114	36	1.036	2	5.1	1.129	13
IV	1.139	47	1.004	3	6.5	1.264	24
V	1.166	56	1.000	14	7.7	1.266	6
VI	1.090	61	0.915	4	12.7	1.142	2
VII	1.200	59	1.036	8	10.5	1.295	18
VIII	1.139	51	0.997	7	10.9	1.204	3
IX	1.179	41	1.085	5	8.4	1.316	20
X	1.157	29	1.130	1	5.4	1.157	10
XI	0.866	20	0.997	3	5.5	0.890	29
XII	0.828	15	1.056	2	3.9	0.831	14
Mean	....	....	1.016	57	8.0	....	.....

4. Mean monthly Q, reduced to the elevation of 30° and to the mean distance of the earth, as the adopted standard for the whole series of months.
5. Number (n) of days of observation that have been used for the formation of the mean Q; these numbers were at the same time considered as the "weights" for the corresponding monthly averages.
6. Mean of the absolute humidity f exprest in millimeters for the days of observation and for the time corresponding to the diurnal[11] value of the intensity.
7. In the last column are indicated the highest values for each month, also their respective dates. These maxima refer

[8] In G., 1906, Chaps. III and IV, pp. 31–73, will be found an examination of the following sources of error: (1) errors due to the application of Newton's law; (2) errors arising from changes in the value of h (coefficient of thermal conductivity) *during* a measurement; (3) errors due to a lack of equality of the coefficient h for the two actinometric bodies because of the differences of their temperatures; (4) errors due to the changes in the value of solar radiation during a measurement; (5) errors due to lack of exact identity of the two actinometric bodies; (6) errors arising from the unequal influence of secondary sources of heat upon each of the two actinometric bodies; (7) errors depending upon the corrections of the actinometric thermometers; (8) errors of observation due to the inequality of the intervals of time; (9) errors in thermometric readings. For the discussion of pyrheliometric errors see G., 1906, Chap. V, pp. 74–88.

[9] See G., 1906, Chap. VII, pp. 104–112.

[10] These tables, not reproduced here, will be published in one of the forthcoming publications of the Meteorological Bureau of Warsaw.

[11] For the determination of the daily values of the intensity of solar radiation see G. 1906; Chap. VIII.

to the sun's elevation at the middle of each corresponding month; they have not been reduced to the mean distance of the earth from the sun.

As to the annual mean of the solar radiation, this was computed as the mean of the data in column 4, i. e., of the monthly means reduced to an elevation of 30° and at the mean distance, the number of days of observations having been taken as weights for the particular values. In an analogous manner the mean annual absolute humidity has been found from the monthly means and the number n of days of observations as their "weights". From Table 1 it appears that the mean of the five years (1901–1905) at Warsaw is equal to 0.990 gr. cal. (the corresponding mean absolute humidity being 7.0 millimeters).

5. *On the character of the annual march of the total intensity of solar radiation at Warsaw.*—An examination of the annual summaries[13] for Warsaw leads to the conclusion that the annual march of the intensity of radiation at Warsaw presents three maxima, viz:

(*a*) Principal maximum in the spring in the months of April or May.

(*b*) Second maximum in summer, during July.

(*c*) Third maximum in the autumn, always occurring during September.

As to the minimum, it occurs in December or January, altho diminutions in the monthly values also appear in June and August, preceding the maxima of summer and autumn.

These results, plainly visible in each annual summary, notwithstanding the individual differences of each year, are accentuated still more if one computes the monthly means for the whole period 1901–1905, using the data given in Table 1.

These means of the five years 1901–1905, for the consecutive months (I–XII), are as follows:

I.... 0.774	IV.... 1.176	VII.... 1.162	X.... 1.000
II.... 0.954	V.... 1.145	VIII.... 1.107	XI.... 0.887
III.... 1.085	VI.... 1.119	IX.... 1.124	XII.... 0.755

It should be understood, however, that the monthly means thus obtained must not be considered as "normals" for Warsaw, because of a strong depression in the intensity of radiation, which is particularly marked in the middle of the period 1901–1905. We shall speak of this in the following paragraph.

6. *Mean annual summary for the five years 1901–1905 at Warsaw.*—The preceding deductions relative to the annual change of the intensity at Warsaw, apply only in part to the period, which might be called abnormal, from December, 1902, to February, 1904. In fact, on comparing the annual means of the intensity of radiation for the successive years 1901–1905 at Warsaw (see Table 1), one is struck by the strong diminution which occurs in 1903. In that year this diminution of the annual mean reaches about 15 per cent of the mean of the five years, and almost 20 per cent of the average for 1901. This marked depression in the intensity of solar radiation, as is well known, is not at all of a character local to Warsaw, nor to the whole of Poland, but it was observed in other parts of Europe and in America where pyrheliometric or actinometric measurements were made during that period.

Considering the fact of this depression as indisputable and general (as follows from the work of Messrs. H. H. Kimball, S. P. Langley, H. Dufour, R. Holm, M. Marchand, and several other eminent observers), let us point out more precisely its character, according to the monthly and annual tables obtained at Warsaw. The duration of the depression extends from December, 1902 to February, 1904, a total of fifteen months. The values of the radiation were so noticeably diminished at that time that it is possible at once to state the limits of this period.

In order to procure numerical data susceptible of comparison, let us prepare a "mean annual summary" for the period

[13] See curves of monthly variation, fig. 2.

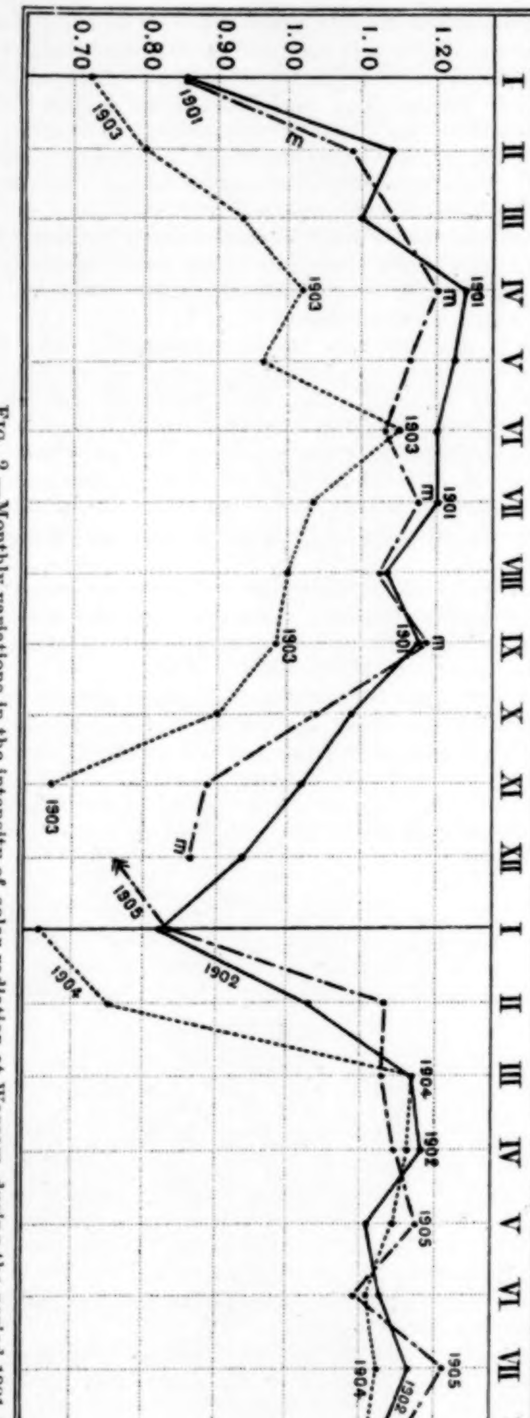


FIG. 2.—Monthly variations in the intensity of solar radiation at Warsaw, during the period 1901–1905.

1901–1905, leaving out the months of this depression. These means are presented in the following Table 2.

TABLE 2.—*Mean annual summary, based on actinometric measurements made at Warsaw during 1901–1905, omitting December, 1902—February, 1904.*

1 Month.	2 Monthly mean. Q	3 h	4 Q 30°; mean distance.	5 n	6 f	7 Max. Q
		°				
I	0.829*	17	1.010	14	3.0	0.937
II	1.082	25	1.126	12	2.7*	1.242
III	1.140	36	1.063	18	3.8	1.324
IV	**1.185**	47	1.047	19	5.4	1.320
V	1.164	56	0.998	48	7.0	1.346
VI	1.118	61	0.944	32	9.1	1.294
VII	**1.173**	59	1.008	35	9.7	1.328
VIII	1.119	51	0.975	31	**10.3**	1.269
IX	**1.159**	41	1.063	32	8.0	**1.367**
X	1.036	29	1.042	15	6.8	1.241
XI	0.887	20	1.018	15	3.6	1.049
XII	0.862	15	1.088	7	4.2	0.975
Mean			1.017	278	7.1	

The monthly means, Q, of the "mean annual summary" (Table 2) are represented graphically in curve m, fig. 2; the curves for each of the consecutive years 1901–1905 are presented in the same figure by lines that are numbered for the consecutive years and that are based on the data of Table 1, column 2.

7. *On the march of the depression of solar radiation as observed at Warsaw.*—By comparing the monthly values of the period December, 1902, to February, 1904, (see Table 1) with the annual summary, Table 2, it is seen that—

(*a*) The depression is suddenly emphasized in the month of December, 1902, giving at Warsaw from its beginning, a value about 20 per cent lower than those of the mean annual summary.

(*b*) On account of this great depression the whole annual march of the intensity of solar radiation in 1903 undergoes a perturbation which has masked, or even changed, the usual variation of radiation, during that year at Warsaw.

(*c*) This depression, persisting from the month of December, 1902, until the month of February, 1904, inclusive, and giving a mean diminution of intensity exceeding 15 per cent at Warsaw, has not had a uniform character in its march, but on the contrary has presented several oscillations.

(*d*) After a sharp and large diminution in December, 1902, and after the particularly low values of the intensity in the months of February and March, 1903, a certain weakening of this depression is marked toward the beginning of the summer of 1903; the values for June of that year at Warsaw are relatively quite high. But in July, and in the following months until October the depression very clearly increases up to about 15 per cent.

(*e*) The end of 1903, as likewise the months of January and February, 1904, present anew a large increase in the depression, and the values of intensity observed during these months seem even lower than at the beginning of 1903. Thus the month of February, 1904, gives values diminished by more than 30 per cent. The depression ends in the same month, in a manner as abrupt as its beginning.

8. *Duration of insolation in hours and total quantity of heat in gram calories at Warsaw during the years 1903, 1904, and 1905.*—This profound perturbation in the intensity of solar radiation as it reaches the surface of the earth may have given rise to important meteorological results. The question as to the influence will be of the highest interest and will necessitate special research, altho the problem presents great difficulties and complications. We add that the study of this question has been already begun in an important memoir, by S. P. Langley, published in the Astrophysical Journal.[13]

[13] S. P. Langley. On a possible variation of the solar radiation, and its probable effect on terrestrial temperature. (Astrophysical Journal, vol. 19, pp. 305–321.)

We shall limit ourselves simply to indicating the duration of insolation at Warsaw, and the sums of heat for the three consecutive years 1903, 1904, and 1905. (See Table 3 and Table 4.) The sums of heat have been calculated[14] from combined readings of heliographs [sunshine recorders] and actinometers; they are exprest in gram-calories per square centimeter of horizontal surface.

TABLE 3.—*Duration of insolation at Warsaw.*

Year.	Winter. I, II, XII.	Spring. III, IV, V.	Summer. VI, VII, VIII.	Autumn. IX, X, XI.	Annual.
	Hours.	*Hours.*	*Hours.*	*Hours.*	*Hours.*
1903	114.9	353.5	462.7	314.8	1245.4
1904	101.7	508.4	849.0	331.5	1790.6
1905	164.9	424.8	754.6	218.6	1562.9

TABLE 4.—*Sums of heat in gram-calories per square centimeter of horizontal surface at Warsaw.*

Year.	Winter. I, II, XII.	Spring. III, IV, V.	Summer. VI, VII, VIII.	Autumn. IX, X, XI.	Annual.
	gr. cal.	*gr. cal.*	*gr. cal.*	*gr. cal.*	*gr. cal.*
1903	1340	10810	17300	7440	36890
1904	930	16190	28960	8150	54230
1905	1910	15760	27790	5460	50920

Taking 3550 hours as the maximum of the possible duration of insolation at Warsaw (which can be registered by heliographs [sunshine recorders] of the Stokes-Campbell type), we find that the actual duration was, in 1903, equal to 35 per cent of the possible maximum duration, while in 1904 there was 50 per cent, and in 1905, 44 per cent of that same possible duration.

The year 1903 presents also a considerable deficiency in respect to the sums of heat, in comparison with the years 1904 and 1905. We find[15] that if the sky were constantly clear the sums in question for the four seasons would be, at Warsaw, 7900, 35,700, 45,000, and 18,200; the total for the whole year would thus be 106,800 gr. cal. per cm.^{2} of horizontal surface. Table 3 shows that in 1903 the ratio of the actual sums received to the theoretical sums is only 35 per cent, whereas in 1904 it is 51 per cent, and in 1905 it is 48 per cent.

THE "SOUTHWEST" OR "WET" CHINOOK.

By H. BUCKINGHAM, sr. Dated Lawton, Okla., March 19, 1907.

In the winter of 1851 I spent a couple of months on Queen Charlotte Island, off the British American coast, sailing from Puget Sound on a gold hunting voyage. I think we sailed from the Sound early in January. We went about half-way (I should think) up the island, and entered Gold Harbor (on the west side). We went east about 12 miles to the head of the harbor and anchored for the winter. We prospected for gold for some two months.

On the 30th of March the chinook winds set in and the snow melted with great rapidity. When we entered the island the only snow we saw was on the coast. East of us was a mountain of rock, I should think 30 miles from the head of the bay. It appeared 10,000 feet high, and was bare when we came in sight of it; but in a couple of weeks it was covered with snow.

After the chinook wind, which appeared to come from the southwest—we took it for granted it was the Japan current—had blown for twenty-four hours it seemed as if the water was leaping from every mountain top. The roar of it was something like Niagara, tho not so deep, as the water was scattered, so to speak.

On the 1st of April we raised anchor, and at 4 p. m. were in

[14] We can not here enter into the details of these calculations. See G. 1906. Chap. XI, pp. 167–186.

[15] According to the "mean" monthly values of the intensity in 1901–1905. See G. 1906; Chap. XI, pp. 172–176.

the open sea, bound for Puget Sound. The weather did not seem as warm when we reached the outside, and I do not remember exactly its temperature; but it was not nearly as cold as when we were on the way up, in January.

THE "DRY" CHINOOK IN BRITISH COLUMBIA.

By R. T. GRASSHAM. Dated Keithley Creek, B. C., March 5, 1907.

I am living at a stock ranch in the Bonaparte Valley—which lies about midway between the Cascade and Gold Ranges and the Rocky Mountains—north of Ashcroft, on the line of the Canadian Pacific Railway.[1] Our district is known as the "dry belt". Very little or no rain falls during the spring or summer. We depend upon irrigation for our crops and hay, and my experience of the chinook is as follows:

After having a cold snap of zero weather, with a foot of snow on the flats and hillsides—bright clear weather—there comes a change; heavy dark clouds loom up from the west and southwest, accompanied by a very strong wind—at times one might call it a gale. No matter what the temperature previous to this change (40° below zero, or anything), within a few minutes the air becomes balmy as spring—by contrast it seems hot. I have known the thermometer to rise 59° in five minutes. When we have this wind, one can read in the daily papers of shipping disasters and storms off the Vancouver Island and Washington coasts. Heavy rain and snow [occur] west of the Cascade Mountains, but I find no account of the temperature being so high west of the Cascade Mountains as with us.

As to the dryness, our house lies in the valley. The Cariboo wagon road is some feet above the house, and the ground rises at an angle of 30° to the first hill, then in a series of benches to timber. The curious phenomenon [may be noted] of having one foot of snow as it were *sucked* up from off the ground (the ground being frozen to the depth of several inches). In three or four hours not a vestige of snow may remain, and yet not a trickle of water crosses the road. As the ground is frozen, therefore the idea of absorption in the ground is untenable; the water does not run off.

Is not the air heated by friction, so that the intense dryness of the wind evaporates and absorbs the moisture?

We never have a chinook in winter accompanied by clear weather, but always dark, stormy-looking clouds, and they rarely last more than three days.

We are much interested in these same chinook winds. This winter I have been at Keithley Creek managing an estate. On the flat the snow was 5 feet deep; on the Bonaparte the snow was 18 inches to 2 feet deep; and all cattle had to be fed—a serious item with a big band of cattle. Usually we need only to feed range cattle once in seven years, our fenced-up winter pastures being fully sufficient, except for a few sick cattle. So when we have a heavy fall of snow and zero weather our sole ambition is for a chinook; and there is no doubt whatever when it does come—we never forget the accompanying atmospheric conditions with us at the ranch, or on the seacoast.

* * * * * * * *

As a rule the barometer drops when strong winds and rain are coming. Is this because of the denseness of atmospheric pressure, accompanied by the dampness or moisture in the atmosphere?

Do you think the barometer will act the same with a gale of wind accompanied by heavy rain, as with a gale accompanied by the heat of a chinook when a dry atmosphere absorbs the moisture from the snow on the flats and steep hillsides with practically no waste?

THE WET AND DRY CHINOOKS.

The following abstract of correspondence on this subject may interest many teachers and observers:

To the best of my knowledge, the name "chinook" is applied to two very different sorts of winds. I believe it was originally applied to a warm, moist southwest wind at stations near the coasts of Oregon, Washington, and British Columbia, which was supposed to blow from the region where the Chinook Indians lived, or to be in some other way associated with them. Quite independently of this use of the word, it was applied by settlers in the west of Montana to a warm, dry wind descending the Rocky Mountain slope. Some thought that it blew from the chinook region of the Pacific coast, others simply said that it was as warm as the chinook winds of the Pacific coast. However, in some way this application of the name to a warm, dry wind descending the mountain in clear weather has become so general that its original application to a moist, southwest wind has been almost lost sight of.

The discussion in reference to the winds of December 22, 1906, hinges upon the definition of a chinook wind. If it means the wet chinook of the coast of British Columbia, then its temperature and moisture are due to the fact that it has just arrived from the Pacific Ocean, laden with moisture which is condensed into cloud and rain as the wind rises over the coast ranges. The Japan current is too far to the west to have any particular influence on either temperature or moisture. On that particular date, December 22, an area of low pressure was west of Vancouver Island, and, whatever the local winds may have been, there must have been a general movement of the atmosphere from the Pacific west of Oregon northeastward toward British Columbia, and this would of itself bring warm, moist air enough to explain a rise of temperature from 12° F. at 8 a. m. to 43° F. at noon (of the one-hundred and twentieth meridian); in fact this southwest wind blows outward from a great area of high pressure central near the Hawaiian Islands, so that its temperatures come from the Tropics, and not from the Japan current. The influence of the Japan current has been exaggerated in popular estimation by many thoughtless writers as much as the influence of the Gulf Stream on the Atlantic Ocean.

A second alternative explanation has been suggested, namely, that the strong southwest gale from the ocean, blocked in its passage over the mountains, rises and precipitates its moisture as rain or snow; then "the wind being lighter as it ascends higher, with increased velocity, continues eastward, and on the eastern slope descends to the valley with such rapidity that the friction warms it up to the recorded temperature".

This proposed explanation seems to be entirely inadmissible if it is intended to apply to Keithley Creek. I do not see how a southwest gale from the Pacific can be said to have past over a mountain range and descend on the eastern slope to this station, which is located on a small stream flowing out of Cariboo Lake into the Frazer River. A westerly wind will blow up the stream from the ocean and an easterly wind down stream from the neighboring hills and the Rocky Mountains. In addition to these geographical objections to this explanation there is a very important meteorological consideration. A wind is not warmed up by friction as it blows over the ground. If the ground is hot and dry it may receive heat by conduction, but if the ground is damp the moisture will evaporate and the wind will be cooled by that process. A "wind that descends to the valley with rapidity" is not warmed up by friction, but by the compression due to the increasing barometric pressure. When air rises it cools by reason of the work done by expansion, as it comes under lower pressure, precisely as steam escaping from a boiler cools by expansion. On the other hand when air descends it comes under greater pressure, and is comprest and warmed by reason of the work done in compressing it. This warming by compression is to be observed whenever air is comprest by machinery; as, for example, in pumping air into the tire of a bicycle. In such compression, if no moisture is added to the air, then the simple increase in temperature makes the air become relatively drier; or we may say that its relative humidity is diminished, or its capacity for moisture is increased. If the air is slightly foggy at first, then the fog disappears as soon as it is slightly comprest and warmed; consequently a descending, warm, chinook wind is also a dry wind with cloudless sky. In this process we have the natural explanation of the dry chinooks of Montana, and also of similar chinooks when they occur in British Columbia. These dry chinooks frequently occur in California, and I do not see why they might not occasionally occur at Keithley Creek; but in this case they should be easterly or northerly winds descending the Rocky Mountain slope. They would not necessarily be very warm, but would be very dry. Thus in California the cold, dry, descending northeast wind, by reason of its causing rapid evaporation, and by reason of the clear sky and danger from frosts, is liable to do great damage to the delicate vegetation.—*C. A.*

The behavior of the barometer is very different in the dry and the wet chinooks. The latter is a moist southwest wind on the east side of an advancing area of low pressure, and the local barometer falls as the low area approaches. Then there follows the strong, dry northwest wind and the rising barometer on the west side of the low area. These winds are called horizontal, because their average inclination toward the ground is slight, and the cooling by expansion or warming by com-

[1] This description places him in latitude 52° 45′ N., longitude 121° 45′ W., approximately.—EDITOR.

pression is correspondingly slight; it also proceeds very slowly and is not prominent to the observer.

In the dry chinook the slope of the descent and ascent is great, and the warming is rapid and prominent; the rise or fall of the barometer is not a prominent feature of the dry chinook, which wind is essentially due to an overturning of the upper and lower layers of air when they are in unstable equilibrium; the dry chinook occurs with equal ease either with southwest winds and falling barometer, or northwest winds and rising barometer, depending on the location of the mountains relative to the station.

The low pressure in the great low areas is not due to the temperature, moisture, or density of the air, but is the mechanical result of the wind, like the whirlpools, vortices, or eddies in rapid rivers, or those made artificially in a basin of water. The large barometric gradient shown by the isobars on our daily maps is not that slight gradient which causes the wind, but is itself essentially produced by the action of the wind.—*C. A.*

THE HURRICANE OF 1867 IN THE BAHAMAS.

Mr. Maxwell Hall calls attention to the fact that the great Bahama hurricane of October 1, 1867, which was partially studied by Buchan (see p. 265 of his "Handybook"), is worthy of a more elaborate study. The material for such a study probably still exists in the archives of the hydrographic offices of France, Germany, England, and America, to say nothing of the observations at land stations, which are preserved in the archives of the meteorological offices of those same nations. Some reliable accounts will also undoubtedly be found in the newspapers and journals for that year. The compilation of these data and the preparation of the charts of isobars and winds would form a very appropriate subject for a thesis for a graduate degree. Such subjects are of great meteorological interest, as well as commercial importance.

During the month of June, 1867, the writer happened to have charge of the library and archives of the Hydrographic Office, U. S. Navy, which had just been removed from the Naval Observatory and was temporarily established in what is known as the "Octagon Building", corner of New York avenue and Eighteenth street. He well remembers the immense collection of log books from vessels of every nationality that had been accumulated by Commodore Maury for use in his enthusiastic researches on the meteorology of the ocean, and his compilation of general sailing charts, to which the modern pilot chart is a worthy successor. The whole series of charts published by him is rare and difficult to obtain. Perhaps very few realize that it included six different series, known by letters, as follows:

Series A. Track charts.
Series B. Trade wind charts.
Series C. Pilot charts.
Series D. Thermal charts.
Series E. Storm and rain charts.
Series F. Whale charts.

The whole series comprises at least eighty charts, published between the years 1849 and 1860, under the general title, "Wind and Current Charts".

The more recent charts of winds, pressure, temperature, currents, etc., on the various oceans, as published by the British, French, and German offices; the daily maps of the Atlantic, published by the French and British, and especially the Danish office; and the daily maps of the Northern Hemisphere, published by the U. S. Weather Bureau, show the great advance in our knowledge since 1860.

It would be interesting to publish the numerical statistics of the great mass of manuscripts and logs of vessels now preserved by the various governmental offices for use in the study of the atmosphere over the ocean. The old records of sailing vessels give us the most precious data, and almost all that we have, relative to those parts of the ocean where the modern steamship never goes. Maury began his work just in time to save the old records before they were destroyed as waste paper, and before sailing vessels were replaced by steamers.

In Bulletin No. 113, published by the U. S. Hydrographic Office, in April, 1897, Mr. James Page says that in addition to an indefinite number of rough logs presented by the masters of vessels that office has 380 abstract logs, each containing three months' records, and 85,000 forms 105*a* and 105*b*, containing the simultaneous Greenwich mean noon observations. The total number of complete observations was then estimated at 4,000,000, but by the present date (1907) this number must have been more than doubled.

NOTES FOR TEACHERS.

The December, 1906, number of School Science and Mathematics refers to several matters that may be interesting to teachers of meteorology. On pages 762–768 we have descriptions of several simple pieces of apparatus for determining the percentage of oxygen in the air. These are designed for use in large classes with the least possible expenditure of the teacher's time. Several pieces of apparatus may be kept in constant service for several weeks without requiring any of the teacher's time. Experimental work of this kind is the only way by which to convey instruction vividly and impressively. The scholar never forgets the percentages (by volume), 21 and 79, when he has made a few measurements of this kind with such apparatus.

A special application of apparatus for measuring the oxygen and the aqueous vapor in the ordinary atmosphere consists in applying it, first of all, to the pure air breathed into the lungs, and then to the impure air exhaled from the lungs. Of course in the latter case increased quantities of carbonic acid gas and aqueous vapor are discovered. We are often taught that this carbonic acid gas is produced by the oxidation of carbonaceous material in the blood when brought into contact with the warm air of the lungs; if this be true then the ratio of the oxygen to the nitrogen in the exhaled air should be less than the $\frac{21}{79}$ of the inhaled air. Possibly the student will be surprised to find that it is not so, and that he has been wrongly taught.

On page 772 is an interesting article by R. A. Millikan on "Cooling through change of state", in which a simple experiment shows the changes of temperature that are produced by crystallization from or solution in liquids. He lays especial stress upon the importance of graphs in some cases, but also confesses that, like many others, he has had "difficulty in finding a sufficient number of sensible and natural applications of the graphical method. The graph should be used as the interpreter of the physics, and not the physics as interpreter of the graph".

On page 778 a method of determining the horsepower of a small steam engine, or the work done in a unit of time, could probably be applied to the wind or to an anemometer for determining the work done by the wind.

On page 795 School Science reprints from Scientific American a general description of the use of hydrolith for generating hydrogen. This hydrolith is supposed to be a hydrate of calcium, and if the data given are correct its use would be of great advantage in aerial research. Unfortunately the article omits to state the fact that this chemical is not for sale in the market. Only a few pounds of it have ever been made. An analogous compound is offered for sale in the United States, under a different name, but its future usefulness is still problematical. The great stimulus recently given to ballooning will, however, undoubtedly bring about many chemical and mechanical improvements.—Editor.

EDUCATIONAL NOTES.

Prof. Josiah Keep, of Mills College, California, under date of March 11, 1907, writes the Editor as follows:

I wish to express my obligations to the MONTHLY WEATHER REVIEW for many interesting and helpful suggestions, which I use with my class in physical geography. Many of the issues I have indexed and placed in a convenient place for reference.

Prof. John L. Tilton, of Simpson College, Indianola, Iowa, under date of April 10, 1907, writes the official in charge, Des Moines, Iowa, that he has this year 45 students in his meteorological class—the largest number he has ever had in the subject. Ward's text is used, supplemented by references to other texts.

At the Chattanooga, Tenn., High School an extensive set of meteorological apparatus has been provided, including almost all the instruments used at a regular station of the Weather Bureau. In October, 1906, a quadruple register was installed and started by Mr. L. M. Pindell, Local Forecaster. Each pupil in the class in meteorology was instructed in the handling and care of the register, and also in the taking of the regular observation, which is taken every day the school is in session. Mr. Pindell has made frequent visits to the class to aid the regular instructor, and on October 30 gave a special lecture to the class on "The weather map".

At the Erie, Pa., High School laboratory work covering the making of synoptic weather charts, rainfall charts, and pressure and temperature curves has been given to the classes in physical geography. These classes and those in physics have visited the Weather Bureau office to become better acquainted with methods of meteorological observation and with the instruments used.

WEATHER BUREAU MEN AS EDUCATORS.

Mr. W. H. Alexander, Observer, began in February a course in elementary meteorology with a class of eight young men, at the University of Vermont, Burlington, Vt. This course is elective, is open to juniors and seniors in the Department of Agriculture, and is to last during the second half of the college year, with one hour per week in the class room.

Beginning next fall it is hoped to give an advanced course in meteorology, open to students who have past in the first course; this will probably cover the first half-year, and call for two hours per week.

It is announced that a course in elementary meteorology will be given by Mr. J. L. Bartlett, Observer, at the summer session of the University of Wisconsin, Madison, Wis., lasting from June 24 to August 3, 1907. This is to be a lecture course, accompanied by practise in the use of meteorological instruments and the taking of weather observations. The lectures are to be given two afternoons each week, and two or more hours of laboratory work per week are expected. The course may be counted as one hour credit for students who are candidates for a degree, but is open to any one who complies with the simple requirements.

Mr. Joseph L. Cline, Observer, Corpus Christi, Tex., under date of May 17, 1907, reports that he has just completed a series of 35 lectures on meteorological and kindred subjects to the seniors and subseniors of the local high school. The pupils were required to read the portions of Waldo's Elementary Meteorology treating of the topics discust in the lectures.

Arrangements have been made for Mr. Cline to deliver a similar series of lectures at the Corpus Christi Summer Normal School, during June and July, 1907.

Mr. George N. Salisbury, Section Director, will probably give a course in meteorology at the summer school session of the University of Washington, at Seattle. The session will extend from June 24 to August 2, 1907, and the proposed course in meteorology is to be given on three afternoons each week.

Mr. W. A. Shaw, Local Forecaster, reports that during the winter term of twelve weeks he gave the regular course of instruction in meteorology at Norwich University, Northfield, Vt. Two hours a week are required in the class room. The course is based on Waldo's Elementary Meteorology as a textbook, but much use is made of other standard works, and of maps, charts, publications of the Weather Bureau, and lantern slides. All members of the senior class are required to take this course.

Mr. A. H. Thiessen, Section Director, early in April completed his series of lectures at the Agricultural and Mechanical College, Raleigh, N. C. There were from six to ten students in the class. One general lecture, with lantern slides, was given, to which the junior class also was invited, about seventy-five attending.

Mr. W. M. Wilson, Section Director, Ithaca, N. Y., writes that he has been appointed instructor in meteorology in the College of Arts and Sciences of Cornell University. Heretofore the instruction given by officials of the Weather Bureau has been under the College of Agriculture, tho students of other colleges have attended. Of the 42 students registered in the course given this year by Mr. Wilson four are from the College of Arts and Sciences. In the past that college has, however, offered a course in meteorology in connection with physical geography, but in future the course offered by the College of Agriculture will be open to the students of the College of Arts and Sciences upon favorable terms.

At the Binghamton Industrial Exposition, in the Public Library Building, Binghamton, N. Y., March 14 to 27, 1907, a Weather Bureau exhibit was prepared by Mr. John R. Weeks, Local Forecaster. About 400 square feet of wall space was taken up by a series of sheets and maps illustrating how the daily weather map is made; other exhibits showed the uses of the map, the publications of the Bureau, and in general the various ways in which the Bureau serves the public. Upon a table close by were shown a duplicate set of instruments and several of the larger books and pamphlets among the publications of the Bureau. The exposition was visited regularly by pupils of the public schools of the city, under the guidance of their teachers, by students of the business colleges, and by many business men. At the end of the exposition part of the wall exhibit was left in the library building as a permanent exhibit.

The system inaugurated by Mr. Weeks, in accordance with which his typewritten lecture, with the accompanying slides, is sent successively to different seminaries, seems to be working satisfactorily. We note that it was delivered April 9, 1907, at Cazenovia, N. Y., and forwarded on April 10, to Fonda.

Mr. R. F. Young, Section Director, during March, 1907, gave a course of ten lessons to a class in physical geography of the Helena, Mont., High School. The subjects included the weather map and the climatology of Montana. The class visited the Weather Bureau office to inspect the instruments, to draw weather maps from current reports, and to study the movements of areas of high and low pressure.

The following lectures and addresses by Weather Bureau men have been reported:

Mr. Ford A. Carpenter, April 16, 1907, before the San Diego,

Cal., Commercial College, on "The business man and the weather map".

Mr. L. H. Daingerfield, April 28, 1907, before the Channing Club of Pueblo, Colo., on "Climate and life of Mesozoic North America".

Mr. R. J. Hyatt, April 9, 1907, before the State Arid Farming Convention, at Salt Lake City, Utah, on "The distribution of precipitation in Utah".

Mr. J. Warren Smith, March 9, 1907, before the Columbus, Ohio, Young Men's Christian Association, on "The work of the Weather Bureau".

Mr. R. H. Sullivan, April 16, 1907, before pupils of the Emerson School, Wichita, Kans., on "The atmosphere".

Mr. A. H. Thiessen, April 18, 1907, before the classes in science at Peace Institute, Raleigh, N. C., on "Forecasting the weather".

Classes from universities, schools, and colleges have visited the Weather Bureau offices to study the instruments and equipment and receive informal instruction, as reported from the following stations:

Albany, N. Y., November 8, 1906, the physical geography class of the State Normal College; February 14, 1907, the junior class of the State Normal College; March 23, 1907, the juniors of the Albany Young Men's Christian Association; May 14, 1907, the physical geography class of the Rensselaer High School.

Columbus, Ohio, March 2, 1907, a class in geology from the Ohio State University; March 5, 1907, the physical geography class of the State Institution for the Blind.

Pueblo, Colo., April 16 and 23, 1907, pupils of the Fountain Public School.

Raleigh, N. C., April 2, 1907, a class in physics from the Baptist University.

RECENT ADDITIONS TO THE WEATHER BUREAU LIBRARY.

H. H. KIMBALL, Librarian.

The following titles have been selected from among the books recently received, as representing those most likely to be useful to Weather Bureau officials in their meteorological work and studies. Most of them can be loaned for a limited time to officials and employees who make application for them.

Bracke, Albert.
Déformations du soleil. Mons. n. d. 16 p. 16°. (Série des curiosités de l'atmosphère. No. 1.)
Nuages irisés. Mons. n. d. 16 p. 16°. (Série des curiosités de l'atmosphère. No. 4.)
Promenade dans la neige. Mons. n. d. 16 p. 16°. (Série des curiosités de l'atmosphère. No. 3.)
Trombes de Belgique. Mons. n. d. 16 p. 16°. (Série des curiosités de l'atmosphère. No. 2.)

Bruel, Georges.
Le cercle du Moyen-Logone. Paris. 1905. 131 p. 8°.

Bürgel, Bruno H.
Wetter-Kalender und kritische Tage für das Jahr 1907. Januar-Juni. Berlin. [1906?] 87 p. 24°.

Drescher, C.
Kosmische Schneewolken. 2 Auflage. Breslau. 1904. 31 p. 8°.

Duncan, Robert Kennedy.
The new knowledge. London. 1906. xviii, 263 p. 8°.

Grühn, Ph.
Die Temperaturverhältnisse Schleswig-Holsteins und Dänemarks. Meldorf. 1896. 30; 24 p. 4°. (Beitr. Jahresb. Gymn. Meldorf. 1895-96; 1896-97.)

Hahn, R.
Das Wetter, die Winde und die Strömungen der Meere. Hamburg. [1904.] 48 p. 4°.

Hollman, M.
Wetterkunde. Eine allgemeinverständliche Anleitung zur Beurteilung der Wetterlage. Berlin. 1907. 52 p. 12°.

Hutter, Franz.
Wanderungen und Forschungen im Nord-Hinterland von Kamerun. Braunschweig. 1902. xiii, 578 p. 4°.

Ihne, E.
Phaenologische Mitteilungen (Jahrgang 1905). n. p. n. d. 28 p. 8°. (S.-A. Abhandl. d. Naturh. Gesellsch. 16 Bd., H. 1. Nürnberg.)

Jefferson, Mark S. W.
Rainfall of the lake country for the last 25 years. n. p. n. d. p. 78-97. 8°. (Repr. 8th annual report Mich. acad. of sc. [1906].)

Kaiser, Max.
Land- und Seewinde an der deutschen Ostseeküste. Inaug.-Diss. . . Halle a. S. Halle a. S. 1906. 22 p. 4°.

Krebs, H.
Was ist morgen für Wetter? Berlin. 1907. 59 p. 12°.

Luedecke, C.
Das Verhältnis zwischen der Menge des Niederschlages und des Sickerwassers nach englischen Versuchen. Berlin. 1906. p. 615-646. 4° (S.-A. Mitt. Landwirtsch. Inst. Königl. Univ. Breslau. 3 Bd. Heft 5.)

MacGregor, Sir William.
Address . . . delivered at the opening of the Newfoundland agricultural exhibition, in the British hall, St. John's, 17th October, 1906. n. p. n. d. 6 p. With tables. f°.

Marloth, R.
Results of experiments on Table Mountain for ascertaining the amount of moisture deposited from the southeast clouds. n. p. n. d. p. 403-408. 4°. (Fr. Trans. South African phil. soc. v. 14. Pt. 4. Oct., 1903.)
Results of further experiments on Table Mountain for ascertaining the amount of moisture deposited from the southeast clouds. (Fr. Trans. South African phil. soc. v. 16. Pt. 2. Oct., 1905.)

Netherlands. Koninklijk Nederlandsch meteorologisch instituut.
Annuaire. 27 année. 1905. A. Météorologie. Utrecht. 1907. xxxvi, 260 p. f°.

Otto, —.
Das Klima von Eisleben nach den meteorologischen Beobachtungen der Jahre 1885-1905. Eisleben. 1906. 19 p. 8°. (Beil. Jahresb. Königl. Gymn. zu Eisleben 1906.)

Pernter, J. M.
Der Formenreichtum der Schneekristalle. Berlin. 1907. 32 p. 12°. (Vorträge Ver. naturw. Kennt. Wien. 46. Jahrg. Heft 15.)

Petre, F. Loraine.
The republic of Colombia. London. 1906. xii, 352 p. 8°.

Rizzo, G. B.
Contributo allo studio del terremoto della Calabria del giorno 8 settembre 1905. (Estr. Atti della R. Acad. Peloritana. v. 23. Fasc. 1.) Messina. 1907. 86 p. 8°.

Rotch, Abbott Lawrence.
Did Benjamin Franklin fly his electrical kite before he invented the lightning rod? Worcester, Mass. 1907. 8 p. 8.

St. Petersburg. Institut impérial forestier. Observatoire météorologique.
Observations 1905. St. Petersburg. 1907. xii, 73 p. 12°.

Schück, A.
Zwei magnetische Beobachtungen vor der Westküste Norwegens im Jahre 1902. Beiträge zur Meereskunde. Hamburg. 1905. v. p. 4°.

Spariosu, Basil.
Wissenschaftlich begründete Wetter-Prognose für das Jahr 1907. Kremsmünster. n. d. 4 p. 24°.

Sreznevskii, B.
Ezhemiesiachnye obzory pogody v Evropie i preimushchestvenno v Evrop. Rossīi (khronika pogody) za 1900. . . [Monthly review of the weather of Europe and especially of European Russia.] . . . St. Petersburg. 1902. viii, 126 p. 4°.

Stonyhurst (England). Stonyhurst college observatory.
Results of meteorological and magnetical observations. 1906. Clitheroe. 1907. vi, 56 p. 12°.

Tananarive. Observatoire de Madagascar.
Observations météorologiques. . . 1904. Tananarive. 1906. vi, 265 p. 8°.

Vernon, Edward.
Is it going to rain? 2d ed. Edinburgh. n. d. 106 p. 16°.

Vregille, Pierre de.
L'Observatoire Tananarive (1898-1906). n. t. p. 12 p. 8°.

Weber, Sir Hermann, and Weber, F. Parker.
Climatotherapy and balneotherapy. London. 1907. 833 p. 4°.

Western Australia. Government astronomer.
Meteorological observations made at the Perth observatory and other places in Western Australia during the year 1905. Perth. 1906. 143 p. f°.

RECENT PAPERS BEARING ON METEOROLOGY.

H. H. KIMBALL, Librarian.

The subjoined titles have been selected from the contents of the periodicals and serials recently received in the Library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate

branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau. Unsigned articles are indicated by a ——

American geographical society. Bulletin. New York. v. 39. May, 1907.

Huntington, Ellsworth. Archæological discoveries in Chinese Turkestan. [Includes remarks on climate of Turfan.] p. 268-272.

American monthly review of reviews. New York. v. 35. May, 1907.

—— Animals as weather prophets. p. 626-629.

Japan. Imperial earthquake investigation committee. Bulletin. Tokyo. Mch., 1907.

Omori, F. Preliminary note on the Formosa earthquake of March 17, 1906. p. 53-69.

Omori, F. Comparison of the faults in the three earthquakes of Mino-Owari, Formosa, and San Francisco. p. 70-72.

Omori, F. Note on the transit velocity of the Formosa earthquakes of April 14, 1906. p. 73-74.

Omori, F. Notes on the Valparaiso and Aleutian earthquakes of August 17, 1906. p. 75-113.

Omori, F. On the distribution of recent Japan earthquakes. p. 114-123.

Meteorological society of Japan. Journal. Tokyo. 2d year. Mch., 1907.

Yamada, J. On the snow temperature observed at Kamikawa. (Japanese.)

Toida, T. Halos as the indicator of coming rain. (Japanese.)

National geographic magazine. Washington. v. 18. May, 1907.

McCurdy, Arthur W. Factors which modify the climate of Victoria. p. 345-348.

Nature. London. v. 75.

—— The Belgian international balloon service. (Apr. 11, 1907.) p. 572-573.

—— Meteorological optics. [Review and résumé of Pernter's Meteorologische Optik.] (Apr. 18, 1907.) p. 577-578.

M. W. The twentieth year at Blue Hill observatory. (Apr. 18, 1907.) p. 593-594.

Chree, Charles. The life work of an eminent meteorologist. [Review of the collected meteorological papers of W. von Bezold.] (May 9, 1907.) p. 28-29.

Thompson, D'Arcy W. The temperature of the North Sea. [Abstract.] (May 9, 1907.) p. 43-45.

Physical Review. Lancaster. v. 24. May, 1907.

Fisher, Willard J. The temperature coefficients of gas viscosity. p. 385-401.

Popular science monthly. New York. Vol. 70. May, 1907.

Brown, Carles W. The Jamaica earthquake. p. 385-403.

Royal meteorological society. Quarterly journal. London. v. 33. Apr., 1907.

Bentley, R. Weather in war time. p. 81-138.

Mawley, Edward. Report on the phenological observations for 1906. p. 139-163.

Inwards, Richard. The metric system in meteorology. p. 165-171.

Scientific American supplement. New York. v. 63.

Geitel, H. Radioactivity and atmospheric electricity. (Apr. 27, 1907.) p. 26176-26177.

Larsen, Alex. Photographing lightning with a moving camera. (May 4, 1907.) p. 26200-26202.

Stendel, —. The intensity of the tropical sun and its effect on the human body. (May 11, 1907.) p. 26214.

Gradenwitz, Alfred. A new direct-reading wind gage. (May 18, 1907.) p. 26232.

Symons's meteorological magazine. London. v. 42. Apr., 1907.

Page, Reginald. Remarks on a waterspout and accompanying phenomena, encountered in the Euxine. p. 46-48.

Ciel et terre. Bruxelles. 28 année. 16 avril 1907.

L., V. D. A propos de la couche isothérmique supérieure. [Note.] p. 104-108.

—— La Fata Morgana [as observed on Lake Geneva]. p. 108.

France. Académie des sciences. Comptes rendus. Paris. Tome 144.

Teisserenc de Bort, L[eon], and Rotch, L[awrence]. Caractères de la circulation atmosphérique intertropicale. (8 avril 1907.) p. 772-774.

Bigourdan, G. Sur les tremblements de terre des 15, 18 et 19 avril 1907, enregistrés à Paris. (22 avril 1907.) p. 823-824.

Brunhes, Bernard. Action d'un courant aérien horizontal sur un tourbillon vertical. (29 avril 1907.) p. 900-902.

Géographie (La). Paris. v. 14. Année 1906. 15 oct.

Brunhes, Jean. L'allure réelle des eaux et des vents enregistrés par les sables. p. 193-210.

Girardin, Paul. La sécheresse dans le Jura en 1906. p. 277-279.

Monaco. Musée océanographique de Monaco. Bulletin.

Berget, A. Les courants marins. (No. 73. 10 mai 1906.) p. 1-19.

Berget, A. Utilité de l'étude des courants. (No. 77. 5 Juin 1906.) p. 1-18.

Legendre, R. Le teneur en acide carbonique de l'air marin. (No. 84. 15 nov. 1906.) p. 1-8.

Nature (La). Paris. 35 année.

Latour, A. Les aurores boréales. [Abstract of paper by P. Villard.] (20 avril 1907.) p. 326-327.

Millochau, A. La température du soleil. [Includes picture and description of the pyrheliometric telescope.] (27 avril 1907.) p. 338-342.

Bellet, Daniel. La vie et le travail dans l'air comprimé. (4 mai 1907.) p. 366-368.

Revue néphologique. Mons. Avril 1907.

Defant, A. Dépendence de la radiation calorifique diffuse de l'époque de l'année. p. 121-124.

B[racke], A. L'appréciation de la nébulosité. p. 124-125.

Société météorologique de France. Annuaire. Paris. 55 année.

Besson, L. Recherches expérimentales sur l'orientation des cristaux de glace atmosphériques. (Fév., 1907.) p. 40-50.

Garrigou-Lagrange, P. Pluies, riviéres et sources du Limousin. [Relations of rainfall to stream flow; experiments under conditions very favorable for observation.] p. 50-52.

Annalen der Hydrographie und maritimen Meteorologie. Berlin. 35 Jahrgang. 1907.

Kaiser, Max. Land- und Seewinde an der deutschen Ostseeküste. p. 149-163.

Deutsche geographische Blätter. Bremen. Band 30. Heft 1.

Breu, Georg. Neue Gewitterstudien an Oberbayrischen Seen. p. 24-30.

Geographische Zeitschrift. Leipzig. 13 Jahrgang. 1907.

Sapper, Karl. Die geographische Verbreitung der Erdbeben. p. 142-152.

Himmel und Erde. Berlin. 19 Jahrgang. April 1907.

Koppe, —. Die relative Feuchtigkeit der Luft an der Riviera. p. 311-315.

Krebs, Wilhelm. Auslaufen westatlantischer Taifunwirbel an europäischen Gestaden. p. 316-323.

Illustrierte aëronautische Mitteilungen. Strassburg. 11 Jahrgang. Apr., 1907.

Berson, Arthur. Wilhelm v. Bezold. p. 105-108.

Meteorologische Zeitschrift. Braunschweig. Band 24. April, 1907.

Ekholm, Nils. Ueber die unperiodischen Luftdruckschwankungen und einige damit zusammenhängende Erscheinungen. p. 145-159.

Conrad, Victor. Bildung und Konstitution der Wolken. [Reviews the recent theories of cloud formation and structure.] p. 159-166.

Köppen, W. Zur Theorie der täglichen Periode der Windstärke. p. 166-171.

Mazelle, Ed. Kälteeinbruch und Bora in Triest, Januar 1907. p. 171-172.

—— Temperaturmaxima in Frankreich. p. 172-173.

Linke, F. Ueber meteorologische Drachenaufstiege auf Samoa. [General similarity of results to those obtained by Hergesell in the northern trade-belt.] p. 173-174.

Busch, Fr. Der Bishopsche Ring in den Jahren 1905 und 1906 nach Beobachtungen in Arnsberg. p. 175-176.

H[ann], J[ulius]. Zum Klima von China. [Results of 10 years' observations at Ho-k'ien (Huo-kiu?)]. p. 178-179.

Hann, J[ulius]. G. Bruel über die Meteorologie der Region des Schari. p. 179-180.

Hann, J[ulius]. Zum Klima der Eritrea (Abessinien). [Includes collected data 1894-1905, and normals.] p. 181-184.

—— Resultate der meteorologischen Beobachtungen zu Dawson City im Jahre 1904. p. 185.

Jensen, Chr. Bemerkungen im Anschluss an die letzte Arbeit des Herrn Sack über die neutralen Punkte von Babinet und Arago in den Jahren 1903 und 1904. p. 185-187.

Naturwissenschaftliche Rundschau. Berlin. 22 Jahrgang. 2 Mai 1907.

Kruger, —. P. Schreiber ueber den Stand des Prognosenwesens im Gebiete des Königreiches Sachsen. [Abstract.] p. 220-232.

Physikalische Zeitschrift. Leipzig. 8 Jahrgang. 1 Mai 1907.

Daunderer, A. Luftelektrische Messungen. p. 281-286.

Eve, A. S. Die Ionisation der Atmosphäre über dem Ozean. [Observations indicating the amount of ionization over the N. Atlantic to be about the same as over Europe and N. America.] p. 286-292.

Sonnblick Verein. 15 Jahres-Bericht. Wien. 1906.

Obermayer, A. von. Zwanzig Jahre meteorologischer Beobachtung auf dem Ben Nevis. p. 5-30.

Hann, Julius. Ergebnisse 20 jähriger meteorologischer Beobachtungen auf den Sonnblickgipfel. p. 31-37.

—— Resultate der meteorologischer Beobachtungen 1906 auf dem Sonnblick, in Bucheben, in Mallnitz und auf der Zugspitze. p. 42-45.

Weltall (Das). Berlin. 7 Jahrgang.

Krebs, Wilhelm. Zur barometrischen Bestimmung von Hochstürmen der Atmosphäre. (April 15, 1907.) p. 206-212.

Krebs, Wilhelm. Zeitgenössiche Schilderung des Erdbebens von 1692 auf Jamaica und seiner Folgen. (April 15, 1907.) p. 214-216. May 1, 1907.) p. 233-236.

THE INTERNATIONAL AERONAUTICAL CONFERENCE OF OCTOBER, 1906, AT MILAN.

By Prof. A. Lawrence Rotch.

[Reprinted, by permission, from Science, No. 648, Vol. XXV, May 31, 1907.]

The history and organization of the International Commission for Scientific Aeronautics, whose name does not indicate that its purpose is to explore the atmosphere, are briefly described in Science, vol. XXI, page 461. The fifth meeting of the commission had been appointed for Rome in 1906, but on account of the exposition at Milan, with its aeronautical section, the place of meeting was changed to the latter city. The conference began on October 1 and lasted thru the 6th, there being about forty members of the commission and guests in attendance. The proceedings were opened by Professor Celoria, representing the exposition of Milan, and a further welcome was extended by Signor Gavazzi on the part of the municipality, by Professor Palazzo for the Italian Government, and by Professor Hergesell as president of the commission. Two presiding officers for each session were chosen from among the foreigners present, who were chiefly Germans. England, however, was unusually well represented by four delegates and guests. The writer was the official representative of the United States Weather Bureau, as well as of the Blue Hill Observatory, and on his proposition Dr. O. L. Fassig, research director at the new Weather Bureau observatory, "Mount Weather", Bluemont, Virginia, was elected a member of the commission, as were also M. Lancaster to represent Belgium and Signori Gamba and Oddone from Italy.

Professor Hergesell reported on the progress of the work which the commission furthers, since its meeting at St. Petersburg in 1904. In Spain unique observations had been obtained with balloons during the total solar eclipse of August 30, 1905. Two expeditions had been sent from France by Messrs. Teisserenc de Bort and Rotch to explore the atmosphere above the tropical Atlantic. In Italy manned and registration balloons at Rome, Pavia, and Castelfranco had contributed data, while kites had been employed in the vicinity of Monte Rosa. In Russia the observatory at Pavlovsk was making aerial soundings and other stations were being equipped for this purpose. In Switzerland Doctor Maurer had compared the data on mountains with those in balloons. In Austria numerous scientific balloon ascensions had taken place. In Great Britain and India kite flights were being made, and in the United States the Government Weather Bureau had joined the Blue Hill Observatory in making kite flights on the term-days. Germany was very active; there were daily observations in the free air at Lindenberg and Hamburg, and in Munich Baron von Bassus and Professor Ebert were experimenting with balloons; the money for a floating observatory on Lake Constance was assured, so that ascents of balloons or kites would eventually be made from a fast steamer; the German Marine had sent a surveying ship, equipped also with apparatus for exploring the air, into the Tropics. The Prince of Monaco, with the cooperation of the speaker, had executed such explorations over the Mediterranean, and over the tropical Atlantic and Arctic oceans. Belgium was now participating in the dispatch of sounding balloons and Roumania had promised to cooperate. The cost of publishing these observations executed in the free air, amounting to about 12,000 francs a year, is defrayed by the countries which collect them. General Rykatchef, in reporting on the resolutions adopted at St. Petersburg, stated that it had not been possible to secure the free entry into the different countries of the balloons and instruments which were used in the experiments.

The topics discust in the subsequent sessions related to the method of investigation or the results obtained and a summary of the most important follows. Doctor Erk, of Munich, advocated balloon ascensions in the neighborhood of the Alps in order to study local phenomena, such as the föhn wind. Professor Ebert indicated the methods which he employed to determine the deformation of equipotential electrical surfaces around a balloon and showed a new apparatus to measure atmospheric ionization.

The use of small balloons to determine the currents in the high atmosphere was discust by Doctor de Quervain and others. If a barometer is carried by the balloon [then] from its trace and from the measured angles of the balloon the course can be plotted. A small balloon may be observed with a telescope to a height of 10 or 12 kilometers, and Professor Hergesell was able, in the clear air of Spitzbergen, to follow a rubber balloon, which expanded to one and a half meters in diameter during seventy-four minutes, at the end of this time the balloon being 80 kilometers distant. Micrometric measurements of its diameter showed the velocity of ascent to be nearly constant, since the loss of gas is slight, so that the height when it enters the different currents may be calculated from a single station, even if the balloon carries no barometer or is not recovered. A mechanical triangulating device has been used by de Quervain for finding the height of the balloon, but this is similar to the apparatus which Mr. Clayton devised for getting the height of clouds at Blue Hill. Colonel Vives y Vich recommended sending up paper pilot balloons simultaneously with the sounding balloons in order to see how the wind changed in the "isothermal zone". Baron von Bassus exhibited an apparatus for reading the curves of the self-recording instruments and Doctor de Quervain discust the thermal inertia of the different thermometers, concluding that the metallic bar of Hergesell was more sensitive than that of Teisserenc de Bort. An interesting discussion followed as to the relative value of observations obtained with kites and balloons, General Rykatchef, Professor Berson and others favoring the former and Professor Hergesell alone championing the latter method.

General Rykatchef, for Mr. Kouznetzof, explained a method that had been employed at Pavlovsk to ascertain the height of clouds at night by projecting a searchlight upon them and measuring the vertical angle of the spot of light, which elicited the information that the same method had been tried in France, at Hamburg, and at Blue Hill.[1] Captain Scheimpflug showed how photographs of the ground taken from a balloon could be rectified so as to be transformed into topographical plans.

A number of communications giving the results of observations in the free air were presented. General Rykatchef stated deductions concerning the vertical gradient of temperature in the free air at Pavlovsk, which is greatest near the ground and during the month of June and least in December. Another paper by Doctor Rosenthal discust the diurnal range of temperature at different heights over the sea. While in the first 100 meters there is a fall of 1° C. in the day and 0.2° at night, in the stratum between 300 and 400 meters the decrease is 0.6° during both day and night.

Mr. Rotch gave the results of the first sounding balloons in America, 53 of the 56 balloons which he had dispatched from St. Louis in 1904–1906 having been recovered. One of the lowest temperatures ever observed (—79° C.) was recorded in January at a height of only 14,800 meters, and the "isothermal", or relatively warm current, which had been found in Europe, was shown to exist at a greater height in the United States. Doctor de Quervain presented proofs [of the existence] of this "isothermal stratum" above 12,000 meters, which had been furnished by ascents of balloons in the daytime. Professor Hergesell related some experiments which he had made to measure the vertical movement of the atmosphere by getting the difference between the calculated rate of ascent of the balloon and the vertical movement of the air recorded, amounting in one case to a downward current of half a meter per second. Professor Berson offered two papers, one being a

[1] See also Monthly Weather Review, Feb., 1907, vol. XXXV, p. 76.— *C. A.*

discussion of more than a thousand kite flights at Lindenberg, in order to ascertain the variation of wind velocity with height, the author concluding that the velocity increases faster than the density of the air decreases. The other paper discust the data from 16 sounding balloons, sent up from Milan the previous summer, 9 of which could be followed in the telescope to a distance of 80 kilometers. Very low temperatures were recorded, and —64° C. at 12,000 meters corresponded to a change of 100° C., from sea level, or nearly the adiabatic rate. Mr. Dines showed views of the kite windlass used by Mr. Cave and gave an example of a large inversion of temperature observed in England up to 2000 meters.

The most interesting communications related to the exploration of the atmosphere over the ocean during the preceding year. M. Teisserenc de Bort gave the results of the last cruise of his steam yacht *Otaria*, which had been sent across the equator by Mr. Rotch and himself. Thirty-nine pilot balloons were launched and 22 balloons with instruments, of which 7 were lost. A captive balloon ascended to 7500 meters and kites were used in the lower strata. The existence on the open ocean of the southwest anti-trade above the northeast trade, and of the northwest anti-trade above the southeast trade, was demonstrated, and it was shown for the first time that the temperature high above the thermal equator is lower than it is at the same height in temperate regions, owing to the absence of "isothermal strata". Professor Hergesell gave a brief account of the cruise which he had made to Spitzbergen on the Prince of Monaco's steam yacht *Princesse-Alice*. Owing to fog and cloud no lofty observations were obtained, but a slow decrease of temperature and a rapid increase of wind with height were indicated. Professor Hergesell explained his method of releasing one of the tandem balloons at a given height, so that the other balloon with the instrument would soon drop and be recovered, even in cloudy weather. It was suggested that the balloon might be liberated also by electrical waves. The same speaker and Professor Köppen described the survey steamer *Planet* of the German Marine, which is making soundings of both the water and the air in the south seas. The thanks of the commission were voted to the German Minister of Marine, the Prince of Monaco, and to Messrs. Teisserenc de Bort and Rotch for their researches over the oceans.

M. Teisserenc de Bort submitted a memoir on the necessity of extending the territory for the international ascensions. In Europe almost all the stations are grouped within an area having less than a thousand kilometers radius, and there are none to the north and southeast. It is necessary to get data from a point to the north of the Scandinavian Peninsula and also to the north of Great Britain. It would be interesting to have one station near the center of the Mediterranean, such as the Etna Observatory, at an elevation of 3000 meters. In Algeria it is proposed to launch pilot balloons and to measure their angles, and in Cairo, where there is a well-organized meteorological service, it is probable that observations can be obtained with kites and pilot balloons and possibly with sounding balloons. In the United States we have observations, due to Mr. Rotch, at Blue Hill and at St. Louis, and an aerial observatory has been established by the Government at Mount Weather in Virginia. The most important place is Newfoundland, where sounding balloons could be launched, even during storms, as the writer, M. Teisserenc de Bort, had done with success in the more restricted region of Denmark. In order to bridge the gap over the ocean, as much as possible, it is proposed to request the Canadian Meteorological Service to make ascensions with pilot balloons at Bermuda; to have this done at the Azores, and to secure the cooperation of the Jamaica and Havana observatories. In Mexico sounding balloons might be used and the system thus developed will permit the general circulation to be determined at different heights around two or three of the most important centers of action in the atmosphere.

At the close of the meeting eleven resolutions were voted, chief of which were the following: The commission, on the recommendation of M. Teisserenc de Bort, realizing the great importance of collecting sufficient observations to chart the meteorological elements at various heights under different atmospheric conditions, believes that its efforts should be concentrated upon four groups of ascensions during the year, called "grand international ascensions", in order to distinguish them from the monthly ascensions. These last are optional for stations which do not make aerial soundings their chief work. The quarterly ascensions will be made during three consecutive days, on dates to be named hereafter. It is recommended that the trajectories of the sounding balloons, and of the pilot balloons, when only these are used, should be determined by angular measurements and that the same thing be done for clouds. It is also desirable, as General Rykatchef has suggested, to have at least one temporary station for these international observations in the midst of the great Asiatic anticyclone, especially in winter. If this can be established the observations should last seven days instead of three days—that is to say, two days before and two days after the normal days.

A subcommission, consisting of Messrs. Teisserenc de Bort, Berson, Hergesell, Köppen, de Quervain, and Rotch, decided to adopt Professor Köppen's proposition to publish a compendium of the best methods of sounding the atmosphere, for which the several establishments actually conducting such investigations will be consulted and the publication made by the international commission. The subcommission also recommended that a form of publication, similar to that used by the Deutsche Seewarte, be adopted for statistics relating to the kite flights and that a similar résumé for balloon ascensions be used by the institutions participating in them.

The commission exprest its satisfaction that atmospheric soundings had been begun by the United States Weather Bureau at Mount Weather and hoped that they might be extended to other stations of the service.

The conference agreed with Major Moedebeck that it would be useful for scientific as well as for ordinary balloon ascension, if, on the topographic maps of the various states there should be indicated in red the location of collections of lights which could serve to orient the aeronaut at night, and if the lines of high electrical potential, and also the places which were sheltered from wind, should be marked on the maps.

The propositions of Professor Assmann, relative to the meetings, were adopted in this modified form: The commission shall meet but once in three years, unless there is special reason for assembling earlier. The reunions are intended to consider the organization of the work and to discuss methods and instruments, scientific communications being relegated to the last and only presented then if time allows.

It was the sense of the meeting that the entertainments in honor of the commission should be restricted henceforth and at the present convention they had been mostly combined with technical demonstrations of aeronautical apparatus in the exposition and elsewhere. Thus, on one excursion to Pavia the aero-dynamical observatory of Signor Gamba was inspected. Afterwards the university was visited and a lunch tendered by the municipality. On another excursion to Lake Maggiore, thru the courtesy of Signor Mangili, president of the exposition committee, experiments in flying kites and liberating sounding balloons from a steamboat were attempted, altho without much success. After the close of the meeting members of the congress had the opportunity of making balloon ascensions, under ideal conditions of weather, in eight balloons which rose from the exposition grounds and landed not far from Milan, a few hours later.

THE SEISMOLOGICAL SOCIETY OF AMERICA.[1]

The first call for a meeting of those interested in the formation of such a society was issued August 22, 1906, by Prof. A. G. McAdie, of San Francisco, Cal. The object of the meeting was the establishment of a society similar in its purposes to the Imperial Earthquake Investigation Committee of Japan. The formation of a society of this character, with headquarters in California, seemed to be in order, especially in view of the fact that the Pacific coast is the locus of occasional seismic activity and that the city of San Francisco, in particular, has vital interests at stake which demand the best information obtainable. The State Earthquake Commission, appointed by Governor Pardee, in a letter dated April 21, 1906, was simply a committee of inquiry acting under instructions to gather information concerning the great earthquake of April 18. The committee was not a permanent one and was without legislative authority or other formal basis,[2] and subsequently placed itself on record as favoring the formation of a permanent seismological society. Several earnest investigators, including Dr. F. Omori, of the Imperial Investigation Committee, urged that organized effort be attempted thru such a seismological society to collect, preserve, and utilize all records, reports, and studies of seismological phenomena.

The society was duly organized and in time incorporated according to the laws of the State of California. The board of directors for 1907 are George Davidson, Andrew C. Lawson, T. J. J. See, Alex. G. McAdie, J. N. LeConte, Geo. D. Louderback, Chas. Burkhalter, W. W. Campbell, C. Derleth, A. C. Leuschner, and J. S. Ricard.

The object of the society, briefly stated, is the acquisition and diffusion of knowledge concerning earthquakes and allied phenomena, and the enlistment of the support of the people and the Government in the attainment of these ends. At the present time the society has a membership of about 200 active members and several life members. The membership is distributed over all of the United States. The society contemplates several lines of work and many committees have already been formed and certain duties assigned. It is hoped that publications similar in scope to those of the earthquake investigation committee may be issued in due time, altho the society is anxious to avoid duplication of work or interference in any way with work in the field of seismology undertaken by others. Its prime purpose is to diffuse knowledge, to mold public opinion, to advise wisely and to provide funds for research and investigation. Its efforts will not be restricted to any one locality or section nor to any nation. It proposes to work for the welfare of all men in the acquisition of knowledge concerning terrestrial disturbances.—*A. G. McAdie.*

[1] We are indebted to Prof. A. G. McAdie for the following information concerning the organization of the Seismological Society of America, contained in his letter, dated May 28, 1907.—*C. F. M.*

[2] The Carnegie Institution has most generously provided for the expenses of the earthquake commission. The State of California has contributed nothing as yet.

CORRIGENDA.

Monthly Weather Review for November, 1906, Vol. XXXIV, No. 11, page 538, El Paso, under "Total Precipitation", for "25.0" read "2.50".

Monthly Weather Review for February, 1907, Vol. XXXV, No. 2, page 76, first column, line 16, for "36.5 inches" read "3.65 inches", and omit the remainder of the sentence.

THE WEATHER OF THE MONTH.

By Mr. P. C. Day, Assistant Chief, Division of Meteorological Records.

PRESSURE.

The distribution of mean atmospheric pressure for April, 1907, over the United States and Canada is graphically shown on Chart VI, and the average values and departures from the normal are shown for each station in Tables I and V.

The influence of pressure distribution on the character of the weather over the United States was as well marked in April as during the preceding month, and, as in March, new records for extreme weather conditions were established at numerous points.

A complete reversal of the pressure distribution that had prevailed in March marked its distribution during April, and the prevailing surface winds and accompanying weather conditions normally expected in March were the most pronounced features of the weather for April.

The comparatively low pressure that prevailed during March over the northwestern districts of the United States and Canada was replaced in April by a decided winter type of high pressure, while the high pressure area of March extending from the southern California coast eastward to the Gulf and northeastward along the Atlantic coast gave way to comparatively low pressure during April.

The diminished pressure over New England, the Atlantic coast districts, and the Lake region multiplied largely the opportunities for the discharge of cold northerly winds over those districts from the high pressure area normal in April over the districts between Hudson Bay and the St. Lawrence Valley, while persistent high pressure over the upper Missouri Valley and the Canadian Northwest Provinces brought the Mississippi and Missouri valleys, the Great Plains, and eastern slope of the Rocky Mountain districts, under the influence of cold northwesterly winds from the region of high pressure to the north.

Pressure during April averaged 0.10 inch, or more, above the normal over the upper Missouri Valley and the Canadian Northwest Provinces, and about the same amount below the normal over the Canadian Maritime Provinces, New England, and the northern portion of the Middle Atlantic States.

Over the Pacific slope and Plateau districts nearly normal conditions of pressure were maintained. An unusual number of storms developed over the central Rocky Mountain districts, which, in the presence of high pressure over the Missouri Valley, moved eastward south of their normal tracks, thereby bringing to the Gulf States frequent and extreme changes in weather.

The central point to which nearly all the storms of the month converged in their eastward progress across the United States was transferred from the normal course down the St. Lawrence Valley to southern New England, and that district was the theater of nearly continuous storm activity during the entire month.

TEMPERATURE.

April, 1907, established new records of thermal conditions over a large part of the United States east of the Rocky Mountains. The month was not noted for extreme cold, however, but for the persistence with which cold and unseasonable weather prevailed. The abnormally warm weather of the latter part of March was followed early in April by a decided fall in temperature over all eastern and southern districts, with freezing temperature and killing frosts as far south as central Georgia.

From the 12th to 15th a severe cold wave moved southeastward from the Dakotas to northern Florida, and freezing temperatures with killing frosts again penetrated the interior of the east Gulf and South Atlantic States.

On the 16th another cold wave overspread all northwestern districts east of the Rocky Mountains, and moved southward during the following day to central Texas and the northern

part of the west Gulf States, with killing frosts in northern Texas and the middle Mississippi and lower Ohio valleys.

A fourth cold period was inaugurated over the northern Rocky Mountain States on the 19th, and extending east and south brought unseasonably cold weather to all districts between the Mississippi Valley and the Rocky Mountains till the 23d, and cool weather prevailed during the remaining days of the month over nearly all districts. The mean temperature was below the normal to an unusual extent over the entire portion of the United States east of the Rocky Mountains, and over the whole of Canada as far as observations extend.

Over all the territory from the Appalachian to the Rocky Mountains the daily temperatures were from 6° to 10° below the seasonal averages, and the monthly means were in numerous instances lower than for the preceding month, and, with the possible exception of April, 1874, lower than before recorded in any April during the preceding half century.

West of the Rocky Mountains conditions as to temperature were reversed. and monthly averages from 2° to 4° above the normal were maintained over the greater portion of those districts.

No pronounced extremes of temperature occurred during the month. Maximum temperatures above 90° were recorded over small areas in southwestern Texas and the southern parts of New Mexico and Arizona, while over the entire northern half of the country the maximum temperatures as a rule did not reach 80°. Temperatures below zero were recorded over a narrow strip along the extreme northern border east of Montana and at some of the elevated stations of the central Rocky Mountain districts. Temperatures as low as 32° occurred as far south as the central parts of the Gulf States, central Texas, and the central portions of New Mexico and Arizona.

No serious frosts occurred over the lower elevations of California.

PRECIPITATION.

The heaviest precipitation, 10 inches or more, occurred in extreme western Florida and over the southern portions of Alabama, Mississippi, and Louisiana, the greater part of which fell in connection with a shallow depression of the barometer over the west Gulf coast and lower Mississippi Valley from the 25th to 26th. The precipitation in New Orleans and immediate vicinity on the 25th was torrential in character, amounting to nearly 10 inches in the twenty-four hours.

Precipitation was rather heavy, from 2 to 7 inches, on the western slopes of the mountains in Colorado and northern New Mexico. It was above the normal generally in the Gulf and South Atlantic States, except central and southern Florida, over northern New England, the upper Lake region, and central and southern Rocky Mountain districts.

Over the remaining portions of the United States precipitation was deficient, especially over central and southern Florida, the lower Missouri Valley, near the coast of California and over portions of western Washington.

Over the greater part of California the month was unusually dry, but little precipitation occurred in any part of the State after the 15th, and practically none fell over the southern half. Over the lower Missouri Valley a decided deficiency occurred, as also over central and southern Florida, where the accumulated deficiency for the period September, 1906, to April, 1907, at various points amounts to more than 20 inches. At Avon Park, in the interior of the southern portion of the State, the total fall for the eight months, September, 1906, to April, 1907, has been but 4.62 inches, less than 15 per cent of the normal fall.

SNOWFALL.

Snow to an unusual depth occurred from the 8th to 10th over the lower Lakes, New England, and the Middle Atlantic States from Virginia northward, in connection with the northward progress of a severe storm along the Atlantic coast during that period. In portions of New England the fall reached depths of from 12 to 18 inches.

Considerable snow fell over the upper Lake region, the upper Missouri Valley, and on the western slopes of the Rocky Mountains, especially over Wyoming, Colorado, and New Mexico, where remarkably heavy falls occurred during the storm periods from the 19th to 21st, and again near the end of the month.

Snowfall was generally light over the Great Plains and in the mountain districts of California and Oregon. In the latter districts much snow still remained in the mountains from the heavy falls during the preceding months, being well packed and in condition to assure an ample supply of water during the summer months. A large amount of snow still remained unmelted in the central Rocky Mountain districts, assuring a well maintained flow of water in the streams of that section. Much snow also remained unmelted on the higher mountains and protected localities at lower elevations in the mountain districts of Idaho and western Montana.

HUMIDITY AND SUNSHINE.

Humidity was in excess of the average in all districts, except southern Florida, over the districts from the upper Lake region to the Dakotas, and the North Pacific coast. Over the entire Rocky Mountain and Plateau districts, the amount of moisture in the atmosphere was much in excess of the average.

There was marked excess of sunshine over the Florida Peninsula, especially in the central and southern portions, where clear weather was almost continuous, and the excess over the Pacific coast was also marked. Over most of the Atlantic and Gulf coast districts, and from the Mississippi Valley to the Rocky Mountains there was a marked dearth of sunshine.

As a whole the weather of the month was such as to retard seriously the development of vegetation and the progress of the usual seasonal pursuits, and the advance of the season so pronounced at the end of March was practically lost, and the end of April found the season retarded from two to three weeks.

WEATHER IN ALASKA.

The daily reports from Alaska, received thru the courtesy of the Chief Signal Officer of the Army, and from the cooperative observers, covering a large portion of that Territory, indicate that the weather during April was unusually mild. But little precipitation occurred, and the snowfall, which at the end of March had accumulated to considerable depths, largely disappeared under the influence of the prevailing warm and clear weather, and at the end of the month the ground was practically bare of snow.

Average temperatures and departures from the normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	12	40.6	− 3.3	−10.0	− 2.5
Middle Atlantic	16	45.8	− 5.0	− 3.1	− 0.8
South Atlantic	10	55.8	− 5.5	+ 5.9	+ 1.5
Florida Peninsula*	8	69.2	− 0.9	+ 9.7	+ 2.4
East Gulf	11	60.7	− 3.9	+15.4	+ 3.8
West Gulf	10	61.7	− 3.7	+19.0	+ 4.8
Ohio Valley and Tennessee	13	47.4	− 7.6	+ 5.4	+ 1.4
Lower Lake	10	39.3	− 5.4	− 3.8	− 1.0
Upper Lake	12	33.8	− 6.6	− 2.7	− 0.7
North Dakota*	9	32.6	− 8.0	− 9.5	− 2.4
Upper Mississippi Valley	15	42.8	− 7.6	+ 4.2	+ 1.0
Missouri Valley	12	43.5	− 6.9	+ 6.8	+ 1.7
Northern Slope	9	39.6	− 3.2	+ 1.8	+ 0.4
Middle Slope	6	48.6	− 5.1	+14.5	+ 3.6
Southern Slope*	7	55.7	− 3.9	+20.4	+ 5.1
Southern Plateau*	12	58.5	+ 2.0	+13.0	+ 3.2
Middle Plateau*	10	49.4	+ 2.2	+18.4	+ 4.6
Northern Plateau*	12	45.9	− 0.9	+ 1.1	+ 0.3
North Pacific	7	48.7	+ 0.3	− 2.1	− 0.5
Middle Pacific	8	57.3	+ 1.9	+ 2.1	+ 0.5
South Pacific	4	59.7	+ 1.6	+ 5.2	+ 1.3

* Regular Weather Bureau and selected cooperative stations.

In Canada.—Director R. F. Stupart says:

The temperature was below the average in all portions of the Dominion, in striking contrast to April of last year, when it was nearly everywhere much above the average. The most pronounced negative departures occurred in the western provinces, ranging from 6° to 13°. In Ontario, also, the temperature was below the average, being as much as from 7° to 10° below in northern and from 4° to 6° in southern localities.

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	6.0	+ 0.2	Missouri Valley	5.7	+ 0.6
Middle Atlantic	6.1	+ 0.7	Northern Slope	5.3	+ 0.7
South Atlantic	5.6	+ 0.9	Middle Slope	5.6	+ 1.6
Florida Peninsula	3.0	— 1.6	Southern Slope	4.6	+ 0.2
East Gulf	5.8	+ 0.6	Southern Plateau	2.4	— 0.6
West Gulf	5.9	+ 0.6	Middle Plateau	4.6	— 0.5
Ohio Valley and Tennessee	6.7	+ 0.6	Northern Plateau	5.2	— 1.9
Lower Lake	6.6	— 1.0	North Pacific	5.2	— 2.1
Upper Lake	6.2	— 0.9	Middle Pacific	5.0	— 0.4
North Dakota	6.4	+ 1.2	South Pacific	4.3	— 0.1
Upper Mississippi Valley	5.9	+ 0.2			

Average precipitation and departures from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		Inches.		*Inches.*	*Inches.*
New England	12	3.30	106	+0.2	—3.1
Middle Atlantic	16	3.11	94	—0.2	—3.7
South Atlantic	10	3.79	112	+0.4	—7.0
Florida Peninsula *	8	2.88	132	+0.7	—6.8
East Gulf	11	7.64	172	+3.2	—3.1
West Gulf	10	3.68	97	—0.1	—4.1
Ohio Valley and Tennessee	13	3.18	80	—0.8	—0.8
Lower Lake	10	1.95	83	—0.4	—0.5
Upper Lake	12	2.55	109	+0.2	—0.4
North Dakota *	9	0.46	24	—1.4	—1.1
Upper Mississippi Valley	15	2.26	76	—0.7	—0.1
Missouri Valley	12	1.42	49	—1.5	—1.2
Northern Slope	9	0.86	52	—0.8	—1.0
Middle Slope	6	1.87	86	—0.3	—0.9
Southern Slope *	7	1.53	68	—0.7	—1.3
Southern Plateau *	12	0.90	150	+0.3	+1.5
Middle Plateau *	10	1.02	100	0.0	+0.9
Northern Plateau *	12	0.88	75	—0.3	+0.5
North Pacific	7	3.36	76	—0.8	—5.0
Middle Pacific	8	0.93	37	—1.6	+3.3
South Pacific	4	0.33	25	—1.0	+2.0

* Regular Weather Bureau and selected cooperative stations.

In Canada.—Director Stupart says:

The precipitation in British Columbia did not differ much from the average, being slightly in excess of it in some districts and not quite equal to it in others. In the western provinces, at Calgary and in the immediate neighborhood, it was more than twice the average amount. At Swift Current, also, the normal was slightly exceeded, otherwise nearly everywhere a deficit occurred. In Ontario it was exceeded in the Georgian Bay region, but only locally in other districts, many localities recording a negative departure. In Quebec and New Brunswick it was above the average from an amount varying between 0.5 inch and 2 inches, whereas in Nova Scotia and Prince Edward Island it was very generally below the average, Halifax recording a deficit of 1 inch. In Ontario the chief positive departures were Parry Sound and Montague, 2.10 inches; Gravenhurst, 1.70 inches; Midland, 1.51 inches; and the more marked negative departures, Stony Creek, 1.40 inches; Lakefield and Port Stanley, 1 inch.

Average relative humidity and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
	%			%	
New England	74	+ 1	Missouri Valley	61	— 4
Middle Atlantic	70	+ 3	Northern Slope	63	+ 5
South Atlantic	72	0	Middle Slope	60	+ 3
Florida Peninsula	73	— 1	Southern Slope	57	+ 6
East Gulf	72	+ 2	Southern Plateau	38	+ 5
West Gulf	73	+ 1	Middle Plateau	51	+ 6
Ohio Valley and Tennessee	69	+ 4	Northern Plateau	58	+ 2
Lower Lake	72	+ 2	North Pacific	72	— 3
Upper Lake	71	— 2	Middle Pacific	72	+ 1
North Dakota	72	+ 2	South Pacific	70	+ 2
Upper Mississippi Valley	67	— 1			

Maximum wind velocities.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Atlanta, Ga	8	60	nw.	Mount Weather, Va	23	70	nw.
Do	9	52	nw.	Do	24	78	nw.
Bismarck, N. Dak	11	56	nw.	New York, N. Y	24	52	w.
Block Island, R. I	9	50	ne.	North Head, Wash	3	76	se.
Do	24	54	nw.	Do	4	66	se.
Canton, N. Y.	22	54	sw.	Do	5	85	se.
Cape Henry, Va	2	54	n.	Do	9	58	se.
Charleston, S. C	2	50	n.	Oklahoma, Okla	2	52	s.
Cheyenne, Wyo	17	50	nw.	Pierre, S. Dak.	11	60	nw.
Columbus, Ohio	7	54	sw.	Point Reyes Light, Cal	1	54	nw.
Duluth, Minn	16	60	nw.	Do	14	54	nw.
Eastport, Me	9	55	e.	Do	15	56	nw.
Hatteras, N. C.	1	55	ne.	Do	16	62	nw.
Do	2	57	ne.	Do	17	51	nw.
Knoxville, Tenn	23	50	sw.	Do	28	62	nw.
Lewiston, Idaho	4	53	w.	Sand Key, Fla	1	56	nw.
Lexington, Ky	7	50	w.	Do	2	50	nw.
Louisville, Ky	7	53	w.	Sioux City, Iowa	1	52	s.
Memphis, Tenn	29	52	sw.	Do	11	52	nw.
Mount Tamalpais, Cal	3	50	nw.	Tatoosh Island, Wash	5	60	sw.
Do	14	50	nw.	Do	7	57	s.
Do	15	54	nw.	Do	8	56	s.
Mount Weather, Va	10	54	nw.	Do	9	56	s.
Do	14	54	nw.	Valentine, Nebr	11	60	nw.

CLIMATOLOGICAL SUMMARY.

By Mr. JAMES BERRY, Chief of the Climatological Division.

TEMPERATURE AND PRECIPITATION BY SECTIONS, APRIL, 1907.

In the following table are given, for the various sections of the Climatological Service of the Weather Bureau, the average temperature and rainfall, the stations reporting the highest and lowest temperatures with dates of occurrence, the stations reporting greatest and least monthly precipitation, and other data, as indicated by the several headings.

The mean temperatures for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperature and precipitation are based only on records from stations that have ten or more years of observation. Of course the number of such records is smaller than the total number of stations.

Section.	Temperature—in degrees Fahrenheit.								Precipitation—in inches and hundredths.					
	Section average.	Departure from the normal.	Monthly extremes.						Section average.	Departure from the normal.	Greatest monthly.		Least monthly.	
			Station.	Highest.	Date.	Station.	Lowest.	Date.			Station.	Amount.	Station.	Amount.
Alabama	58.2	— 4.6	Camp Hill	89	27	Riverton	24	14	6.26	+2.36	Mobile	11.90	Decatur	3.24
Arizona	62.3	+ 0.8	Parker Sentinel	105 105	9 11	Chiarsons Mill	14	22	0.61	+0.07	Chiarsons Mill	3.24	8 stations	0.00
Arkansas	54.9	— 6.6	Brinkley	89	29	Harrison Mammoth Spring	24 24	13, 14 14	5.44	+1.04	Dutton	8.99	Russellville	3.29
California	58.2	+ 1.7	Mammoth Tank	108	10	Summit	6	20	1.11	—1.00	Monumental	11.84	20 stations	0.00
Colorado	43.0	— 1.1	Sheridan Lake	98	10	Longs Peak	—10	30	2.00	—0.06	Corona	7.90	Silt	0.24
Florida	67.6	— 1.9	Bartow	97	26	Johnstown	27	13	3.73	+1.36	Monticello	10.40	Bartow	T.
Georgia	57.9	— 4.7	Waycross	93	30	3 stations	24	15	5.64	+2.54	Blakely	12.57	Resaca	2.68
Hawaii	69.2†	......	Hauula, Oahu	95	30	Volcano House, Haw	45	9	5.15‡	......	Keanae Valley, Maui	28.63	Ewa, Oahu	0.04
Idaho	45.2	— 0.2	Hotspring Orofino	80 80	12 13	5 stations	10	4 dates	1.33	—0.19	Burke	4.15	Chesterfield	0.30
Illinois	44.2	— 7.6	3 stations	83	29	Zion	11	14	2.76	—0.30	Robinson	4.34	Knoxville	0.29
Indiana	43.4	— 8.9	Rome	86	29	Auburn South Bend	17 17	15, 16 1	2.80	—0.45	Moores Hill	4.39	Logansport	1.71
Iowa	41.5	— 7.7	Clarinda	80	24	Earlham Washta	10 10	14 17	1.32	—1.59	Burlington	3.22	Inwood	0.24
Kansas	48.7	— 6.1	Ulysses	93	11	Colby	5	30	1.41	—1.31	Walnut	5.94	Dodge City	0.19
Kentucky	48.2	— 7.5	Shelbyville	87	28	Farmers	19	15	2.78	—0.82	Hopkinsville	5.24	Loretto	1.69
Louisiana	64.2	— 2.7	Lake Charles	94	29	Amite	31	2	6.26	+1.75	New Orleans	13.73	Lakeside	2.49
Maryland and Delaware	47.0	— 4.3	Great Falls, Md	86	26	Deer Park, Md	9	2	3.33	+0.07	Dover, Del	4.69	Chewsville, Md	1.44
Michigan	35.1	— 7.8	Adrian	77	29	Humboldt	— 9	1	2.72	+0.68	Ball Mountain	4.80	Port Austin	0.70
Minnesota	34.7	— 8.6	Pipestone	77	2	Bagley	— 1	14	1.01	—1.20	Grand Meadow	2.25	Beardsley	0.15
Mississippi	59.6	— 5.0	Magnolia, Natchez	90	28	Bellefontaine	26	2	6.36	+1.92	Biloxi	13.75	Columbus	3.36
Missouri	48.7	— 7.0	Caruthersville	89	29	Unionville	16	14	3.43	—0.21	Warsaw	5.75	St. Joseph	1.08
Montana	38.8	— 4.0	Billings	79	9	Gold Butte	—10	28	1.09	—0.23	Snowshoe	7.77	Chinook	0.03
Nebraska	42.7	— 6.3	Fairmont	88	24	Fort Robinson	3	26	0.95	—1.69	Weepingwater	3.01	Halsey	0.13
Nevada	50.1	+ 3.2	Logan	94	11, 12	McAfees Ranch	12	29	0.58	—0.21	Clover Valley	1.73	Mill City	0.00
New England*	40.0	— 3.5	Nashua, N. H	77	30	Van Buren, Me	— 3	8	3.20	+0.42	Madison, Me	6.32	Patten, Me	1.50
New Jersey	45.2	— 4.5	Beverly Indian Mills	83 83	26 26	3 stations	19	2	3.78	+0.44	Woodbine	8.67	Layton	2.06
New Mexico	52.0	— 0.4	Carlsbad	97	10	3 stations	6	22	1.48	+0.52	Eagle Rock Ranch	4.88	2 stations	0.00
New York	39.5	— 4.6	Allegany Hunt	80 80	28 29	Indian Lake	7	7	3.00	+0.39	Lake George No. 1	5.28	Harkness	1.29
North Carolina	51.8	— 5.8	4 stations	87	28-30	Buck Spring	9	14	4.21	+0.39	Beaufort	7.24	Pinehurst	2.49
North Dakota	31.9	— 9.5	Jamestown	80	21	Langdon	— 6	13	0.57	—1.20	Lakota	2.08	Wishek	T.
Ohio	42.5	— 7.2	Pomeroy	86	29	Hillhouse, Hudson	10	2	2.74	—0.01	Philo No. 2	5.38	Sandusky	1.19
Oklahoma and Indian Territories	55.6	— 5.1	Temple, Okla	97	29	Hooker, Okla	20	17	3.62	+0.90	Stillwater, Okla	6.71	Chattanooga, Okla	0.75
Oregon	49.0	+ 1.1	Grants Pass	88	21	Silver Lake	10	4, 7	3.35	+0.40	Glenora	12.19	Lakeview	0.22
Pennsylvania	43.6	— 4.8	Claysville	84	29	Franklin, Warren	8	2	2.63	—0.74	Somerset	4.42	Scranton	1.02
Porto Rico	74.1	......	Central Aguirre	96	16	Aibonito	48	11	1.16	......	Lares	2.66	2 stations	0.00
South Carolina	56.4	— 5.7	Blackville	89	26	Walhalla	20	11	4.40	+1.05	Edisto	9.07	Winnsboro	2.40
South Dakota	38.4	— 8.0	Leola	85	2	De Smet Kidder	4 4	16 3 dates	0.83	—1.40	Flandreau	1.94	2 stations	0.10
Tennessee	51.6	— 6.3	Savannah	88	29	Erasmus	14	15	4.50	+0.32	Dyersburg	7.54	Palmetto	2.52
Texas	62.5	— 2.9	Fort McIntosh	107	11	Claude	20	29	2.42	—0.45	San Marcos	6.16	El Paso	0.07
Utah	50.6	+ 1.8	St. George	95	12	Soldier Summit	2	19	0.95	—0.20	Meadowville	2.65	3 stations	0.00
Virginia	48.1	— 5.7	Roanoke	89	27	Mount Weather	13	2	3.99	+0.73	Williamsburg	6.40	Cape Henry	2.56
Washington	47.4	— 1.2	Mottingers Ranch	89	21	Northport	13	28	2.31	—0.20	Clearwater	14.04	Wahluke	T.
West Virginia	45.6	— 5.7	Sutton	92	29	Bayard Terra Alta	10 10	2 2	3.49	—0.33	Pickens	6.66	2 stations	1.42
Wisconsin	36.4	— 8.4	Prairie du Chein Port Washington	72 72	22 22	Koepenick	0	14	2.40	+0.02	Sturgeon Bay	5.46	Medford	0.50
Wyoming	37.9	— 2.2	Hyattville	85	1	Wells	— 9	18	1.15	—0.28	Eatons Ranch	5.00	2 stations	T.

*Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut. †46 stations, with an average elevation of 595 feet. ‡136 stations.

DESCRIPTION OF TABLES AND CHARTS.

By Mr. P. C. DAY, Assistant Chief, Division of Meteorological Records.

For description of tables and charts see page 30 of REVIEW for January, 1907.

TABLE I.—*Climatological data for U. S. Weather Bureau stations, April, 1907.*

Stations.	Elevation of instruments: Barometer above sea level, feet.	Elevation of instruments: Thermometers above ground.	Elevation of instruments: Anemometer above ground.	Pressure, in inches: Actual, reduced to mean of 24 hours.	Pressure, in inches: Sea level, reduced to mean of 24 hrs.	Pressure, in inches: Departure from normal.	Temperature: Mean max. + mean min. ÷ 2.	Temperature: Departure from normal.	Temperature: Maximum.	Temperature: Date.	Temperature: Mean maximum.	Temperature: Minimum.	Temperature: Date.	Temperature: Mean minimum.	Temperature: Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches: Total.	Precipitation: Departure from normal.	Precipitation: Days with .01, or more.	Wind: Total movement, miles.	Wind: Prevailing direction.	Wind: Maximum velocity: Miles per hour.	Wind: Maximum velocity: Direction.	Wind: Maximum velocity: Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness during daylight, tenths.	Total snowfall.
New England.							40.6	− 3.3										74	3.30	+ 0.2										6.0	
Eastport	76	69	85	29.72	29.81	− .12	36.6	− 1.7	56	30	43	20	3	30	20	33	30	81	4.54	+ 1.5	12	10,025	w.	55	e.	9	7	10	13	6.6	26.3
Portland, Me.	103	81	117	29.73	29.86	− .10	38.9	− 4.1	63	22	45	24	7	33	30	34	29	70	2.75	− 0.3	9	8,025	nw.	48	nw.	24	8	9	13	5.8	17.6
Concord	288	70	79	29.54	29.86	− .13	40.6	− 3.2	74	30	50	19	7	31	34	....	....	....	2.85	0.0	9	5,427	nw.	33	nw.	24	14	7	9	4.4	20.6
Burlington	404	12	47	29.44	29.90	− .09	37.7	− 5.7	68	29	46	15	6	29	32	....	....	....	2.56	+ 0.6	11	8,570	nw.	47	s.	29	10	9	11	5.8	9.2
Northfield	876	16	70	28.92	29.89	− .10	36.4	− 3.8	73	30	46	13	7	27	34	34	30	76	4.66	+ 2.6	10	7,132	nw.	36	nw.	24	3	13	14	7.0	23.0
Boston	125	115	188	29.72	29.86	− .11	43.4	− 1.9	73	30	51	27	3	35	31	38	33	71	3.31	− 0.1	11	8,928	w.	48	nw.	24	7	5	18	6.7	3.1
Nantucket	12	14	90	29.83	29.84	− .13	42.0	− 2.2	60	30	47	31	21	37	17	38	34	78	2.90	− 0.7	12	13,220	sw.	47	ne.	9	10	10	10	6.1	1.0
Block Island	26	11	46	*29.84	29.87	− .11	41.2	− 2.6	58	29	47	28	3	36	17	38	35	82	2.69	− 0.7	12	13,971	nw.	54	nw.	24	10	11	9	5.3	1.2
Narragansett	.....	9	....	......	......	......	41.2	− 3.4	60	30	49	25	3	34	24	....	....	....	3.69	+ 0.1	13	......	w.	....	......	...	12	9	9	...	9.0
Providence	160	57	67	29.69	29.87	− .11	42.7	− 3.9	68	26	51	26	3	34	28	37	30	68	4.24	......	13	6,371	nw.	32	nw.	24	9	12	9	5.5	9.6
Hartford	159	122	132	29.70	29.88	− .11	43.4	− 3.3	72	26	52	25	2	35	30	38	32	69	3.24	......	11	6,198	nw.	29	s.	25	6	10	14	6.7	8.6
New Haven	106	116	155	29.77	29.89	− .10	43.4	− 3.0	66	25	52	25	2	35	32	38	31	68	3.00	− 0.5	14	7,857	n.	37	nw.	24	11	8	11	5.6	7.3
Mid. Atlantic States.							45.8	− 5.0										70	3.11	− 0.2										6.1	
Albany	97	102	115	29.79	29.90	− .10	42.6	− 3.2	73	25	51	23	7	34	37	37	32	69	2.33	− 0.2	12	7,129	s.	33	se.	30	7	9	14	6.4	8.5
Binghamton	875	79	90	28.96	29.91	− .11	39.6	− 4.8	70	25	48	17	2	31	36	....	....	....	2.01	− 0.1	13	5,854	nw.	31	sw.	25	6	4	20	7.5	4.0
New York	314	108	350	29.55	29.89	− .11	45.0	− 3.1	73	25	52	26	2	38	31	40	35	72	3.89	+ 0.5	15	9,924	nw.	52	w.	24	8	8	14	6.0	6.1
Harrisburg	374	94	104	29.53	29.93	− .09	45.4	− 5.3	75	25	54	22	2	37	33	39	32	62	2.12	− 1.3	12	6,977	w.	33	nw.	24	10	4	16	6.0	0.4
Philadelphia	117	116	184	29.79	29.92	− .09	47.4	− 3.4	78	26	56	25	2	39	35	42	37	72	2.88	− 0.1	12	8,691	nw.	35	n.	5	7	7	16	6.2	T.
Scranton	805	111	119	29.04	29.91	− .10	42.0	− 5.1	76	25	51	20	2	33	41	37	30	67	1.02	......	10	6,574	nw.	32	nw.	25	4	9	17	7.1	4.4
Atlantic City	52	37	48	29.86	29.92	− .08	43.6	− 4.0	65	5	50	25	2	37	26	39	35	75	3.37	+ 0.1	14	7,660	nw.	33	ne.	9	6	10	14	6.5	1.9
Cape May	17	48	52	29.92	29.94	− .05	44.6	− 3.8	68	5	50	26	2	39	26	40	....	....	2.88	− 0.3	11	8,512	nw.	31	n.	2	7	10	13	6.1	3.7
Baltimore	123	69	117	29.79	29.92	− .09	47.8	− 5.2	80	25	56	23	2	39	36	41	32	59	3.13	− 0.3	12	7,239	nw.	31	w.	10	7	8	15	6.3	T.
Washington	112	59	76	29.81	29.93	− .09	48.4	− 4.7	83	26	58	23	2	39	39	43	37	71	3.61	− 2.2	9	5,849	nw.	38	nw.	24	7	15	8	5.4	1.4
Cape Henry	18	11	58	29.92	29.94	− .06	49.2	− 5.4	79	26	56	30	2	43	29	....	....	....	2.56	− 1.9	12	12,545	n.	54	n.	2	10	10	10	5.5	
Lynchburg	681	83	88	29.21	29.96	− .06	49.8	− 5.8	83	26	60	25	2	40	39	43	37	67	3.43	+ 0.1	13	4,301	nw.	25	nw.	24	11	12	7	5.6	3.9
Mount Weather	1,725	10	57	28.08	29.94	− .08	41.9	− 6.5	74	26	50	13	2	33	30	38	34	77	3.01	......	10	14,868	nw.	78	nw.	24	10	12	8	5.1	12.7
Norfolk	91	102	111	29.85	29.95	− .06	51.0	− 5.0	81	30	59	29	2	43	31	45	40	72	3.21	− 0.9	13	8,359	n.	38	w.	9	6	10	14	6.3	
Richmond	144	145	153	29.80	29.96	− .06	50.4	− 6.8	84	26	60	25	2	40	33	....	....	....	4.87	+ 1.2	12	7,597	s.	41	sw.	23	10	8	12	5.4	T.
Wytheville	2,293	40	47	27.56	29.97	− .06	44.4	− 7.6	77	29	54	22	2	35	40	39	36	79	3.29	+ 0.2	12	5,259	w.	36	w.	23	8	9	13	5.9	0.2
S. Atlantic States.							55.8	− 5.5										72	3.79	+ 0.4										5.6	
Asheville	2,255	53	75	27.60	29.99	− .04	48.0	− 5.9	79	26	58	23	15	38	37	43	40	82	3.89	− 0.8	11	7,607	nw.	38	e.	6	5	9	16	6.7	0.5
Charlotte	773	68	76	29.14	29.98	− .05	52.8	− 6.4	81	29	62	28	15	43	32	45	39	64	2.57	− 1.0	9	6,897	ne.	42	sw.	23	6	14	10	6.0	T.
Hatteras	11	12	47	29.93	29.94	− .07	52.8	− 5.2	74	30	59	33	2	47	22	49	47	85	3.99	− 0.7	12	14,097	n.	57	ne.	2	14	6	10	5.0	0.3
Raleigh	376	71	79	29.56	29.96	− .07	52.1	− 6.9	83	30	62	28	2	42	32	46	40	69	3.63	+ 0.4	10	5,868	n.	29	sw.	23	8	11	11	5.6	T.
Wilmington	78	81	91	29.88	29.97	− .06	55.1	− 5.3	80	30	64	32	15	46	31	48	43	71	4.29	+ 1.3	10	7,023	sw.	33	w.	8	7	16	7	5.6	
Charleston	48	14	92	29.93	29.98	− .05	58.0	− 5.8	77	30	65	36	14	51	23	53	48	76	3.72	+ 0.1	16	8,915	sw.	50	n.	2	8	13	9	5.4	
Columbia, S. C.	351	41	57	29.59	29.98	− .05	56.9	− 5.9	85	30	68	29	15	46	36	49	42	64	2.61	− 0.2	11	6,400	sw.	48	sw.	23	6	13	11	5.8	
Augusta	180	89	97	29.78	29.98	− .05	57.8	− 5.4	84	30	68	30	15	48	33	50	44	66	3.82	+ 0.5	13	5,801	s.	38	w.	8	8	15	7	5.1	
Savannah	65	81	89	29.92	29.99	− .04	60.0	− 4.7	82	23	68	36	14	52	27	52	47	71	4.07	+ 0.6	14	6,630	sw.	35	n.	7	9	10	11	5.8	
Jacksonville	43	101	129	29.95	30.00	− .04	64.0	− 3.6	83	22	73	40	3	55	29	58	54	77	5.27	+ 2.4	10	8,004	sw.	47	sw.	23	12	9	9	5.0	
Florida Peninsula.							71.9	− 0.9										75	0.63	− 1.5										3.0	
Jupiter	28	10	48	29.96	29.98	− .06	70.8	− 1.4	90	17	80	46	2	62	30	65	62	76	0.69	− 2.1	4	8,781	sw.	40	nw.	1	12	16	2	4.0	
Key West	22	10	53	29.97	29.99	− .03	75.2	− 0.3	86	23	80	57	3	70	19	68	64	72	0.46	− 0.8	4	7,390	se.	48	nw.	1	22	7	1	2.2	
Sand Key	25	41	71	29.96	29.99	− .03	74.6	......	89	24	78	58	3	72	15	....	....	....	0.11	......	3	1,0228	se.	56	nw.	1	19	10	1	2.6	
Tampa	35	79	96	29.97	30.01	− .05	69.6	− 1.0	87	28	79	43	2	60	30	61	57	72	0.74	− 1.6	3	6,999	sw.	32	n.	1	17	10	3	3.1	
East Gulf States.							60.7	− 3.9										72	7.64	+ 3.2										5.8	
Atlanta	1,174	190	216	28.75	30.00	− .03	54.2	− 6.9	78	27	63	30	14	45	30	48	41	67	3.63	− 0.1	12	7,091	nw.	60	nw.	8	10	7	13	5.7	T.
Macon	370	55	66	29.59	29.99	− .04	59.4	− 3.7	84	30	70	31	15	49	35	....	....	....	5.83	+ 2.3	11	4,082	nw.	24	w.	23	12	7	11	5.0	
Thomasville	273	8	57	29.70	30.00	− .03	63.0	− 3.7	87	30	74	34	15	52	36	56	51	73	6.66	+ 3.7	18	4,852	s.	33	s.	6	13	9	8	4.5	
Pensacola	56	79	96	29.94	30.00	− .02	64.6	− 3.1	82	8	71	40	2	58	26	....	....	....	8.97	+ 5.5	10	8,451	s.	45	sw.	5	9	8	13	5.8	
Anniston	741	9	58	29.21	30.01	− .02	55.8	− 4.6	82	25	66	28	14	45	37	....	....	....	6.10	+ 1.7	14	4,543	nw.	30	sw.	8	8	4	18	7.0	
Birmingham	700	136	144	29.24	30.00	− .02	57.7	− 5.8	79	25	66	32	2	49	34	50	44	69	6.51	+ 0.3	12	6,372	n.	30	sw.	8	5	10	15	6.6	
Mobile	57	98	106	29.92	29.99	− .03	64.1	− 1.9	81	7	72	41	2	57	30	58	54	75	11.90	+ 7.2	8	6,966	se.	39	s.	5	10	11	9	5.4	
Montgomery	223	100	112	29.75	30.00	− .03	60.4	− 4.8	83	28	70	35	14	51	29	54	48	70	6.01	+ 1.2	13	5,586	sw.	33	nw.	8	11	4	15	5.9	
Meridian	375	84	93	29.59	29.99	− .03	60.2	− 3.9	84	28	70	36	2	50	33	54	50	76	8.77	+ 4.4	15	4,730	ne.	27	w.	23	10	7	13	5.7	
Vicksburg	247	62	74	29.71	29.99	− .01	61.4	− 3.8	85	28	70	40	2	52	30	54	48	69	6.52	+ 0.7	12	5,265	ne.	26	nw.	8	9	7	14	6.0	
New Orleans	51	88	121	29.92	29.98	− .02	66.8	− 1.1	84	18	75	46	2	59	23	60	56	74	13.18	+ 8.0	5	7,535	s.	36	n.	19	8	10	12	5.8	
West Gulf States.							61.7	− 3.7										75	3.68	− 0.1										5.9	
Shreveport	249	77	84	29.71	29.99	+ .02	60.6	− 5.2	84	29	70	42	2	51	31	54	48	71	6.70	+ 1.5	10	5,908	se.	29	nw.	16	9	7	14	5.8	
Bentonville	1,303	11	44	28.61	30.02	+ .06	51.2	− 5.7	77	28	61	30	13	41	37	....	....	....	3.66	......	10	5,000	n.	28	s.	3	6	8	16	6.8	
Fort Smith	457	79	94	29.48	29.97	+ .01	55.0	− 6.7	80	29	64	38	13	46	35	49	42	66	3.32	− 1.8	10	7,142	e.	44	nw.	6	9	9	12	5.4	
Little Rock	357	93	100	29.61	29.99	+ .01	55.8	− 6.9	83	29	64	38	2	48	30	49	43	67	5.66	+ 0.9	11	6,271	ne.	42	s.	27	7	5	18	7.0	
Corpus Christi	20	48	53	29.91	29.94	− .01	70.2	− 0.7	88	8	76	47	30	64	29	64	62	81	0.94	− 0.6	6	8,627	se.	31	ne.	13	7	12	11	5.8	
Fort Worth	670	106	114	29.25	29.96	+ .02	61.8	− 3.5	90	10	73	38	30	50	41	....	....	....	1.31	− 2.0	6	9,669	s.	40	sw.	29	11	17	2	4.4	
Galveston	54	106	112	29.91	29.97	.00	68.5	− 0.2	79	12	73	55	21	64	18	64	62	84	4.00	+ 1.1	7	9,212	se.	38	n.	19	2	24	4	5.8	
Palestine	510	73	79	29.42	29.95	− .01	61.8	− 4.1	86	11	71	43	30	53	29	55	51	73	3.68	− 0.9	11	6,328	ne.	31	s.	29	5	9	16	6.9	
San Antonio	701	80	91	29.20	29.92	− .01	67.7	− 1.3	99	11	79	45	30	56	36	58	53	70	3.77	+ 0.8	7	6,083	se.	37	n.	25	11	8	11	5.4	
Taylor	583	55	63	29.34	29.95	.00	64.6	− 2.9	96	11	76	39	30	53	39	....	....	....	5.69	......	8	8,308	s.	44	n.	16	10	6	14	5.7	
Ohio Val. and Tenn.							47.4	− 7.6										69	3.18	− 0.8										6.7	
Chattanooga	762	106	112	29.20	30.02	− .01	53.3	− 6.7	78	25	62	30	15	44	32	46	40	68	3.82	− 0.7	16	5,976	s.	48	w.	8	7	7	16	6.3	T.
Knoxville	1,004	35	88	28.92	29.98	− .05	51.2	− 6.2	79	29	60	26	15	42	33	45	39	66	3.79	− 1.2	16	6,530	sw.	50	sw.	23	4	8	18	7.2	T.
Memphis	399	76	97	29.59	30.02	+ .02	54.6	− 7.2	85	29	62	36	1	47	24	49	45	73	4.03	− 1.5	13	7,372	ne.	52	sw.	29	5	10	15	6.6	
Nashville	546	79	91	29.43	30.02	+ .01	51.8	− 7.3	80	25	61	30	14	42	31	46	41	70	4.66	− 0.1	15	5,026	nw.	30	sw.	30	4	7	19	7.4	T.
Lexington	989	75	102	28.91	30.00	− .02	45.3	− 8.4	78	29	54	23	2	37	31	....	....	....	1.83	− 1.9	15	8,777	ne.	50	w.	7	11	7	12	5.4	0.1
Louisville	525	111	132	29.42	30.01	.00	48.0	− 8.2	82	29	57	27	2	39	30	41	35	65	2.42	− 2.0	13	7,191	n.	53	w.	7	7	4	19	6.8	0.1
Evansville	431	72	82	29.51	29.98	− .02	47.8	− 8.6	80	29	56	26	1	40	32	....	....	....	2.43	......	12	6,025	ne.	40	sw.	7	5	14	11	6.2	T.
Indianapolis	822	154	164	29.09	30.00	.00	43.3	− 9.1	75	28	52	23	1	35	31	38	32	69	2.07	− 1.7	11	7,813	n.	36	sw.	7	5	8	17	7.1	0.6
Cincinnati	628	152	160	29.21	30.00	− .01	45.4	− 8.9	80	29	54	26	2	37	32	40	34	65	3.68	+ 0.5	14	5,908	w.	36	sw.	7	7	6	17	6.8	0.8
Columbus	824	173	190	29.09	29.98	− .04	43.0	− 8.0	77	29	52	20	2	34	32	38	32	70	3.27	+ 0.1	16	9,794	nw.	54	sw.	7	5	4	21	7.4	1.5
Pittsburg	842	336	352	29.04	29.96	− .06	43.8	− 7.2	80	29	53	17	2	35	30	38	33	70	1.99	− 0.8	11	8,616	nw.	44	s.	23	6	7	17	6.8	2.0
Parkersburg	638	77	84	29.31	29.98	− .05	46.0	− 7.0	82	29	55	23	2	37	36	40	36	72	2.65	− 0.3	16	5,647	nw.	32	nw.	7	9	6	15	6.4	2.5
Elkins	1,940	41	50	27.90	29.99	− .04	42.3	− 6.4	80	29	52	14	2	32	45	37	33	75	3.90	+ 0.3	19	3,780	w.	23	nw.	23	8	5	17	6.7	10.4
Lower Lake Region.							39.5	− 5.4										72	1.95	− 0.4										6.6	
Buffalo	767	178	206	29.08	29.93	− .08	38.0	− 4.3	71	28	44	19	2	32	27	34	31	78	2.00	− 0.5	13	10,200	sw.	42	w.	16	6	9	15	6.9	2.6
Canton	448	10	71	29.41	29.90		37.4	− 5.1	71	29	46	15	6	29	37				3.45		16	8,544	sw.	54	sw.	22	10	4	16	6.5	4.9
Oswego	335	76	91	29.54	29.92	− .09	38.3	− 4.9	73	29	44	22	1	32	34	35	31	74	2.40	+ 0.3	13	8,932	nw.	33	s.	29	9	3	18	6.3	3.5
Rochester	523	81	102	29.36	29.94	− .07	40.0	− 3.9	78	29	47	22	1	33	35	35	29	70	2.00	− 0.5	12	6,888	nw.	28	w.	21	7	6	17	6.8	2.5
Syracuse	597	97	113	29.26	29.92	− .09	39.2	− 5.2	71	29	47	20	2	32	35				3.44		15	10,056	nw.	40	s.	29	7	8	15	6.7	5.9
Erie	713	92	102	29.17	29.95	− .07	39.7	− 5.0	77	29	46	19	2	34	30	35	29	70	1.86	− 0.6	14	8,620	w.	49	se.	7	6	8	16	7.2	T.
Cleveland	762	190	201	29.13	29.96	− .06	40.0	− 6.0	78	29	47	22	2	33	38	36	30	70	1.68	− 0.6	16	11,987	nw.	44	nw.	10	7	9	14	6.4	2.7
Sandusky	629	62	70	29.27	29.96	− .06	40.4	− 6.9	78	29	48	21	2	33	37				1.19	− 1.3	14	7,247	sw.	31	nw.	6	8	7	15	6.5	0.8
Toledo	628	207	246	29.27	29.97	− .06	40.8	− 6.5	77	29	49	21	2	32	37	36	30	69	2.16	− 0.1	10	11,302	nw.	44	ne.	6	8	8	14	6.2	1.0
Detroit	730	153	193	29.16	29.96	− .06	39.1	− 6.4	72	29	47	19	2	31	35	35	29	71	2.33	+ 0.1	10	9,102	nw.	36	e.	6	8	9	13	6.6	0.8
Upper Lake Region.							33.8	− 6.0										71	2.55	+ 0.2										6.2	
Alpena	609	13	92	29.29	29.98	− .04	32.8	− 5.2	63	22	40	16	1	26	32	29	24	71	2.41	+ 0.2	13	9,072	nw.	36	se.	7	6	11	13	6.1	10.0
Escanaba	612	40	82	29.33	30.02	.00	31.5	− 5.7	58	22	38	9	1	25	28	28	22	71	2.17	+ 0.1	13	8,950	n.	35	nw.	9	11	6	13	5.5	17.4
Grand Haven	632	54	92	29.28	29.98	− .03	36.0	− 8.0	59	3	43	19	1	29	26	32	27	72	2.73	+ 0.2	12	10,161	n.	40	w.	16	7	8	15	6.7	4.7

TABLE I.—*Climatological data for U. S. Weather Bureau stations, March, 1907*—Continued.

Stations.	Elevation of instruments. Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Pressure, in inches. Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Temperature of the air, in degrees Fahrenheit. Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches. Total.	Departure from normal.	Days with .01, or more.	Wind. Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Direction.	Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness during daylight, tenths.	Total snowfall.
Up. Lake Reg—Cont.																															
Grand Rapids	707	121	162	29.20	29.98	− .04	37.6	− 8.6	68	28	46	19	1	29	29	33	28	70	2.94	+ 0.8	10	8,596	nw.	36	w.	16	9	3	18	6.8	3.1
Houghton	668	66	74	29.28	30.02	.00	29.2	− 7.7	52	21	36	− 1	1	22	39	....	....	....	3.88	....	14	5,944	n.	34	ne.	16	10	10	10	5.2	36.0
Marquette	784	77	116	29.21	30.03	+ .01	29.8	− 7.7	53	21	36	11	1	24	22	27	22	72	3.81	+ 1.8	15	8,908	nw.	40	nw.	8	7	7	16	6.7	33.4
Port Huron	638	70	120	29.24	29.95	− .07	26.8	− 5.4	67	29	45	16	2	29	31	33	28	72	2.64	+ 0.5	9	9,953	n.	36	w.	16	6	9	15	6.6	0.5
Sault Ste. Marie	614	40	61	29.29	30.01	− .02	28.8	− 6.7	51	21	36	5	1	22	30	26	22	74	1.31	− 0.8	11	7,782	nw.	37	w.	19	6	10	14	6.5	5.8
Chicago	823	140	310	29.00	30.00	.00	39.8	− 6.1	70	24	46	23	14	34	31	36	31	72	2.37	− 0.7	13	12,155	nw.	48	sw.	24	7	8	15	6.6	1.9
Milwaukee	681	122	142	29.26	30.01	+ .02	37.2	− 4.6	67	22	44	22	14	31	27	33	29	74	3.41	+ 0.6	11	9,464	n.	35	e.	5	7	10	13	6.1	8.5
Green Bay	617	49	86	29.30	29.98	− .03	35.0	− 5.7	65	23	42	18	1	28	28	31	26	71	3.39	+ 0.8	11	9,471	n.	46	n.	12	9	5	16	6.8	15.1
Duluth	1,133	11	47	28.78	30.03	+ .02	30.9	− 7.5	55	22	38	12	13	23	29	27	20	67	0.92	− 1.5	7	10,603	nw.	60	nw.	16	11	10	9	4.8	5.1
North Dakota.							32.2	− 8.5										72	0.64	− 1.1										6.4	
Moorhead	940	8	57	29.04	30.08	+ .09	33.0	− 8.4	66	21	42	15	13	24	36	30	26	80	0.64	− 1.6	7	8,411	nw.	34	nw.	8	6	6	18	7.0	4.0
Bismarck	1,674	8	57	28.27	30.11	+ .14	35.0	− 7.6	69	21	47	14	16	23	44	29	21	63	0.67	− 1.6	5	9,104	nw.	56	nw.	11	6	17	7	5.8	4.6
Devils Lake	1,482	11	44	28.46	30.10	+ .11	28.4	− 9.8	65	21	38	5	13	19	33	26	22	79	0.70	− 0.2	7	10,296	nw.	47	n.	15	9	10	11	5.7	6.2
Williston	1,875	14	44	28.04	30.08	+ .12	32.4	− 8.1	60	14	43	10	16	22	32	28	21	67	0.53	− 0.9	6	8,113	n.	49	nw.	11	4	11	15	7.0	3.1
Upper Miss. Valley.							42.3	− 7.6										67	2.26	− 0.7										5.9	
Minneapolis	.....	102	208	.....	.....	.....	37.0	.....	62	2	46	20	17	28	25	....	....	....	1.37	− 1.4	5	11,279	nw.	44	s.	1	12	9	9	5.1	13.0
St. Paul	837	171	179	29.10	30.02	+ .03	37.2	− 8.5	62	22	46	19	17	29	26	32	23	58	1.32	− 1.2	5	9,847	nw.	43	nw.	8	9	15	6	5.8	9.0
La Crosse	714	71	87	29.23	30.02	+ .04	39.8	− 7.5	67	22	48	23	14	32	27	....	....	....	1.79	− 0.5	6	6,343	n.	32	n.	12	6	9	15	6.7	0.8
Madison	974	70	78	28.91	29.99	.00	37.6	− 6.9	68	22	45	23	14	30	30	33	29	74	3.00	+ 0.6	11	9,620	nw.	44	n.	24	8	8	14	6.5	5.2
Charles City	1,015	8	58	28.93	30.03	+ .05	38.8	− 7.5	66	22	49	18	14	29	35	34	29	71	0.87	− 1.7	5	7,839	nw.	36	nw.	8	9	5	16	6.5	T.
Davenport	606	71	79	29.33	30.00	+ .02	43.0	− 7.2	74	24	52	24	14	34	33	38	32	69	1.90	− 0.9	10	6,717	nw.	32	nw.	12	12	6	12	5.6	0.6
Des Moines	861	84	101	29.12	30.04	+ .07	42.2	− 8.4	72	24	52	19	17	32	35	36	27	62	1.48	− 1.3	10	7,297	nw.	32	sw.	24	6	14	10	6.2	8.7
Dubuque	698	100	117	29.26	30.02	+ .04	41.6	− 7.3	69	24	50	24	14	33	31	36	30	68	2.48	− 0.3	7	5,632	nw.	26	nw.	11	11	4	15	5.7	1.6
Keokuk	614	64	77	29.33	30.02	+ .04	46.2	− 5.8	77	24	57	25	17	36	34	39	34	70	2.02	− 1.2	10	5,795	nw.	29	sw.	24	15	9	6	4.3	T.
Cairo	356	87	93	29.63	30.02	+ .03	50.8	− 7.5	81	29	59	32	1	43	34	44	37	65	3.81	− 0.1	11	7,974	ne.	48	w.	7	5	12	13	6.4	
La Salle	536	56	64	29.45	30.04	+ .05	41.6	− 8.2	73	24	51	23	14	33	36	....	....	....	2.36	....	12	7,228	ne.	38	sw.	24	8	7	15	6.3	1.1
Peoria	609	11	48	29.33	30.01	+ .02	43.4	− 7.5	75	28	53	22	14	34	35	37	31	66	2.82	....	11	8,021	nw.	39	s.	24	6	12	12	5.6	0.7
Springfield, Ill.	644	10	92	29.30	20.00	+ .02	45.0	− 7.0	77	28	54	27	1	36	29	39	33	68	2.80	− 0.9	12	7,693	nw.	34	s.	24	8	10	12	6.1	T.
Hannibal	534	75	109	29.44	30.02	+ .04	45.4	− 8.2	77	24	54	25	14	37	30	....	....	....	2.92	+ 0.2	11	7,449	nw.	42	sw.	24	7	10	13	6.0	T.
St. Louis	567	208	217	29.38	30.00	+ .02	47.0	− 9.1	79	28	55	30	1	39	29	41	35	66	3.65	− 0.1	10	8,689	se.	39	nw.	8	9	7	14	6.1	T.
Missouri Valley.							43.5	− 6.9										61	1.42	− 1.5										5.7	
Columbia, Mo.	784	11	84	29.14	29.98	.00	47.4	− 6.9	81	28	58	27	14	37	33	....	....	....	3.85	+ 0.9	13	6,812	n.	34	nw.	8	9	8	13	5.6	T.
Kansas City	963	78	95	29.00	30.06	+ .10	47.7	− 6.6	80	24	57	28	13	38	37	40	32	60	1.84	− 1.1	9	6,119	nw.	36	nw.	12	11	12	7	4.9	0.6
Springfield, Mo	1,324	98	104	28.57	29.99	+ .02	48.5	− 7.7	79	28	58	26	13	39	30	42	36	67	2.53	− 1.3	15	8,037	se.	34	nw.	8	8	11	11	5.8	
Iola	984	40	47	28.97	30.04	+ .08	49.3	− 4.9	83	3	60	26	13	39	34	....	....	....	2.84	....	8	7,017	ne.	35	sw.	24	8	6	16	6.5	T.
Topeka	.....	85	89	.....	.....	.....	47.2	− 6.5	83	24	58	25	13	36	40	....	....	....	0.83	− 1.9	8	7,591	n.	45	s.	24	13	7	10	5.1	0.5
Lincoln	1,189	11	84	28.74	30.03	+ .09	43.5	− 7.2	78	24	54	20	17	33	38	36	26	56	1.01	− 1.6	5	9,483	n.	45	nw.	11	11	14	5	5.0	3.5
Omaha	1,105	115	121	28.84	30.05	+ .10	42.8	− 7.7	73	24	52	23	13	34	35	35	26	58	1.31	− 1.8	9	8,494	n.	43	nw.	24	6	9	15	6.5	5.9
Valentine	2,598	47	54	27.28	30.40	+ .10	39.0	− 6.4	79	1	51	16	16	26	41	33	25	65	0.91	− 1.9	7	9,122	nw.	60	nw.	11	6	18	6	5.2	2.9
Sioux City	1,135	96	164	28.82	30.06	+ .11	40.2	− 8.3	71	22	50	19	13	30	32	....	....	....	0.81	− 2.2	5	11,600	nw.	52	nw.	11	7	8	15	6.4	0.9
Pierre	1,572	70	75	28.36	30.06	+ .11	40.0	− 6.5	81	1	51	17	13	29	39	33	24	59	0.62	− 1.3	9	9,156	nw.	60	nw.	11	7	13	10	5.8	2.9
Huron	1,306	56	67	28.64	30.07	+ .11	37.4	− 7.2	73	1	49	15	16	26	41	32	24	65	1.15	− 1.8	5	10,149	nw.	46	nw.	11	14	8	8	4.8	4.2
Yankton	1,233	49	57	28.71	30.06	+ .11	40.0	− 7.4	70	22	50	18	13	30	32	....	....	....	0.78	− 2.3	6	7,759	nw.	42	nw.	15	5	8	17	6.9	4.2
Northern Slope.							39.6	− 3.3										63	0.80	− 0.3										5.3	
Havre	2,505	11	44	27.35	30.03	+ .10	37.3	− 5.4	66	9	48	16	27	27	38	33	28	73	0.89	− 0.1	9	7,449	e.	42	sw.	5	10	15	5	5.1	7.9
Miles City	2,371	26	48	27.48	30.08	+ .12	41.9	− 2.8	75	14	54	14	16	30	43	34	28	62	0.61	− 0.5	7	6,043	n.	36	nw.	10	5	17	8	5.4	2.8
Helena	4,110	8	56	25.78	30.03	+ .06	39.9	− 2.1	70	9	51	10	28	29	36	33	24	57	0.80	− 0.3	13	5,816	w.	40	w.	7	9	10	11	5.8	10.2
Kalispell	2,962	8	34	26.92	30.01	+ .05	40.6	− 1.9	68	22	52	11	28	29	42	34	26	62	0.87	....	10	4,194	w.	32	w.	13	11	11	8	5.1	5.9
Rapid City	3,234	46	50	26.89	30.08	+ .13	38.4	− 5.1	75	1	50	13	16	27	40	33	28	73	0.79	− 1.5	9	5,918	nw.	36	nw.	15	14	7	9	5.0	1.0
Cheyenne	6,088	56	64	23.94	29.97	+ .06	39.3	− 2.4	72	10	51	13	21	27	35	32	24	62	1.32	− 0.1	11	8,321	nw.	50	nw	17	6	11	13	6.1	11.0
Lander	5,372	26	36	24.59	29.98	+ .04	41.4	− 0.8	71	9	54	12	25	28	43	33	24	56	1.19	− 1.5	8	3,691	ne.	34	w.	10	6	18	6	5.6	11.7
Yellowstone Park	6,200	11	48	23.80	29.99	+ .03	34.2	− 2.8	63	13	45	8	25	23	34	28	21	63	1.12	....	12	6,296	nw.	30	s.	5	9	19	2	4.8	11.2
North Platte	2,821	11	51	27.07	30.04	+ .12	43.3	− 5.7	76	1	58	15	30	28	47	34	26	62	0.43	− 1.7	6	7,240	n.	36	nw.	11	14	7	9	4.7	3.2
Middle Slope.							45.6	− 5.1										60	1.87	− 0.3										5.6	
Denver	5,291	129	136	24.67	29.96	+ .06	45.7	− 2.0	80	10	58	14	21	34	40	36	26	53	2.91	+ 0.9	12	6,069	n.	42	n.	19	4	20	6	5.8	25.0
Pueblo	4,685	80	86	25.23	29.93	+ .05	47.4	− 3.1	86	10	60	12	21	34	47	38	29	59	2.42	+ 1.0	8	6,070	se.	44	nw.	7	12	9	9	5.1	12.1
Concordia	1,398	42	47	28.53	30.03	+ .10	46.2	− 7.4	80	24	58	21	17	35	39	38	31	62	0.72	− 1.6	5	6,239	n.	30	s.	1	6	19	5	5.3	3.2
Dodge	2,509	44	54	27.38	30.00	+ .10	47.8	− 6.6	85	2	62	20	30	34	48	39	30	58	0.19	− 1.4	4	6,436	se.	28	se.	1	12	11	7	5.4	1.2
Wichita	1,358	78	86	28.58	30.03	+ .10	50.0	− 6.6	81	24	62	25	17	28	39	41	33	58	0.91	− 2.0	6	7,762	ne.	34	sw.	24	9	12	9	5.6	T.
Oklahoma	1,214	10	47	28.67	29.96	+ .04	54.4	− 5.2	88	3	66	32	30	43	38	46	40	68	4.06	+ 1.4	7	13,751	n.	52	s.	2	6	10	14	6.3	T.
Southern Slope.							60.9	− 1.5										57	0.75	− 0.8										4.6	
Abilene	1,738	45	54	28.13	29.93	+ .03	61.8	− 2.6	92	10	75	35	30	48	45	52	43	57	0.37	− 2.4	4	7,834	s.	33	n.	29	6	19	5	5.5	
Amarillo	3,676	10	49	26.20	29.92	+ .05	52.6	− 2.0	90	10	68	23	30	37	55	43	36	65	1.25	− 0.5	7	10,313	s.	40	n.	4	18	8	4	3.7	8.3
Del Rio	944	8	57	28.93	29.91	+ .02	70.8	+ 0.8	106	11	84	43	30	58	48	....	....	....	0.09	....	5	7,647	se.	38	nw.	4	11	10	9	5.0	
Roswell	3,578	9	57	26.25	29.85	.00	58.4	− 2.2	96	10	76	26	22	41	53	45	33	48	0.64	+ 0.2	3	5,495	w.	46	n.	4	15	11	4	4.0	4.8
Southern Plateau.							59.0	+ 1.2										38	0.66	+ 0.1										2.4	
El Paso	3,762	10	110	26.12	29.83	.00	64.6	+ 0.8	92	10	79	31	22	50	43	46	27	31	0.07	− 0.1	2	9,487	w.	42	w.	19	19	8	3	2.6	T.
Santa Fe	7,013	33	39	23.19	29.86	+ .02	47.0	− 0.6	77	10	59	20	22	35	39	36	26	52	2.04	+ 1.3	8	5,791	ne.	31	nw.	6	19	7	4	3.4	11.8
Flagstaff	6,907	12	44	23.31	29.86	+ .02	44.9	+ 2.7	75	11	59	18	22	30	45	35	24	53	1.39	− 0.2	5	6,434	sw.	37	sw.	15	16	7	7	4.1	1.7
Phoenix	1,108	50	56	28.72	29.86	− .01	68.6	+ 2.0	96	11	84	42	4	54	38	51	32	30	0.35	0.0	3	3,493	e.	24	nw.	30	23	7	0	1.9	
Yuma	141	16	46	29.72	29.87	− .02	69.5	− 0.6	99	10	86	45	4	54	46	54	40	40	0.00	− 0.1	0	5,097	sw.	33	n.	20	28	2	0	0.7	
Independence	3,910	11	42	25.94	29.90	.00	59.3	+ 2.6	86	10	74	34	4	44	41	45	31	39	0.14	− 0.1	2	5,765	n.	40	n.	20	28	1	1	2.0	
Middle Plateau.							50.6	+ 3.3										51	1.06	0.0										4.6	
Reno	4,532	56	63	25.46	29.98	+ .01	50.8	+ 3.5	79	12	65	29	3	37	43	40	30	52	0.72	+ 0.3	2	4,734	w.	27	sw.	4	18	8	4	3.6	
Tonopah	6,089	12	20	24.03	29.95	....	51.1	+ 7.6	75	9	62	30	3	41	27	39	26	42	0.22	....	4	6,473	nw.	29	nw.	6	17	12	1	3.5	
Winnemucca	4,344	18	56	25.60	29.98	+ .02	51.2	+ 4.1	78	12	65	27	30	37	42	41	31	53	0.88	− 0.1	4	5,420	sw.	36	sw.	13	13	10	7	4.1	
Modena	5,479	10	43	24.56	29.89	+ .01	49.2	+ 2.3	79	11	64	22	30	34	47	40	31	57	0.51	− 0.2	4	8,112	w.	38	sw.	14	11	11	8	5.0	
Salt Lake City	4,366	105	110	25.57	29.93	+ .01	51.4	+ 1.3	75	13	60	29	21	43	31	43	34	55	1.46	− 0.8	9	5,038	nw.	32	w.	4	14	8	8	4.1	0.5
Durango	6,546	18	56	23.57	29.85	.00	46.6	+ 0.2	75	10	60	22	21	33	40	36	25	53	2.42	+ 1.3	11	4,659	nw.	26	ne.	19	4	17	9	6.1	2.9
Grand Junction	4,608	43	51	25.29	29.85	− .03	53.6	+ 0.4	82	10	67	30	21	40	39	41	27	44	0.34	− 0.3	4	4,245	nw.	27	s.	15	10	11	9	5.6	T.
Northern Plateau.							48.2	− 0.8										58	0.81	− 0.5										5.2	
Baker City	3,471	48	58	26.43	30.04	+ .04	44.4	+ 0.9	70	12	55	25	28	33	36	37	29	61	0.87	− 0.3	8	4,811	nw.	27	nw.	23	11	6	13	5.5	4.9
Boise	2,739	78	86	27.15	30.02	+ .04	49.8	− 0.8	73	12	60	29	29	30	32	41	31	54	1.02	− 0.1	8	4,307	nw.	27	w.	17	10	8	12	5.6	T.
Lewiston	757	10	51	29.24	30.06	+ .07	50.9	− 2.0	76	22	62	27	28	40	38	....	....	....	0.31	− 0.7	7	4,411	e.	53	w.	4	11	9	10	5.0	
Pocatello	4,477	46	54	25.44	29.97	+ .03	47.0	+ 0.2	72	12	57	22	29	37	33	38	28	55	1.14	− 0.4	10	7,261	se.	40	w.	17	9	16	5	4.6	0.5
Spokane	1,929	101	110	27.97	30.04	+ .05	46.2	− 1.5	73	13	57	24	28	35	35	38	29	58	0.65	− 0.7	7	5,226	sw.	30	sw.	4	7	13	10	5.9	T.
Walla Walla	1,000	71	79	28.98	30.05	+ .04	51.0	− 1.8	77	21	61	32	28	41	32	44	37	62	0.88	− 0.7	7	4,454	s.	32	sw.	4	14	9	7	4.3	
N. Pac. Coast Reg.							48.7	+ 0.3										72	3.36	− 0.8										5.2	
North Head	211	11	56	29.86	30.09	+ .04	48.6	+ 1.1	67	20	53	37	5	44	20	45	41	78	2.66	− 2.8	12	11,771	nw.	85	se.	5	10	10	10	5.3	
Port Crescent	259	12	29	29.78	30.07	+ .06	43.3	− 1.4	64	31	52	25	28	34	33	....	....	....	2.86	− 1.2	12	4,153	nw.	17	nw.	9	12	5	13	4.6	
Seattle	123	185	224	29.95	30.08	+ .05	49.1	− 0.3	69	21	58	36	28	41	27	44	37	68	1.54	− 1.3	10	6,582	s.	37	s.	5	10	10	10	5.3	
Tacoma	213	113	120	29.85	30.08	+ .05	48.6	− 0.3	72	21	58	32	28	39	31	....	....	....	2.49	− 1.0	8	4,711	sw.	26	w.	9	11	8	11	5.4	
Tatoosh Island	86	7	57	29.95	30.05	+ .05	46.6	+ 0.5	61	19	51	35	5	42	19	43	40	78	6.70	− 0.7	14	10,635	s.	60	sw.	5	11	8	11	5.4	T.
Portland, Oreg.	153	68	106	29.92	30.07	+ .01	52.2	+ 1.0	79	21	61	35	10	43	33	46	38	67	3.57	+ 0.3	9	4,937	nw.	34	s.	4	16	2	12	4.6	
Roseburg	510	9	57	29.52	30.08	+ .01	52.4	+ 1.5	84	21	65	31	27	40	44	46	40	70	3.69	+ 1.1	8	2,491	w.	20	sw.	4	11	8	11	5.4	

TABLE I.—*Climatological data for U. S. Weather Bureau stations, April, 1907*—Continued.

Stations.	Elevation of instruments.			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.									Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.			Wind.					Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness during daylight, tenths.	Total snowfall.
	Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.				Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Direction.	Date.					
Mid. Pac. Coast Reg.							57.3	+ 1.9										72	0.93	– 1.6										5.0	
Eureka	62	62	80	30.05	30.12	+ .01	51.3	+ 1.8	70	20	55	39	3	48	23	48	45	81	3.30	– 1.0	8	6,496	n.	36	nw.	18	5	13	12	6.5	
Mount Tamalpais	2,375	11	18	27.58	30.06	+ .01	53.4	....	72	19	60	37	3	47	19	47	41	66	0.98	....	6	10,532	nw.	54	nw.	15	12	9	9	4.6	
Point Reyes Light	490	7	18	29.50	30.02	....	52.2	....	65	20	56	46	3	49	17	....	....	....	0.20	– 1.5	3	16,214	nw.	62	nw.	16	8	9	13	6.2	
Red Bluff	332	50	56	29.64	30.00	– .03	60.7	+ 1.6	82	30	71	39	3	51	36	53	47	66	0.81	– 1.4	4	4,349	se.	30	nw.	19	14	6	10	4.7	
Sacramento	69	106	117	29.94	30.01	.00	60.3	+ 2.3	80	11	69	45	27	52	26	54	48	69	0.25	+ 2.0	3	6,700	s.	31	nw.	18	15	6	9	3.9	
San Francisco	155	200	204	29.88	30.05	.00	56.8	+ 3.1	81	19	63	45	3	51	24	51	47	76	0.11	– 1.9	4	4,920	w.	24	sw.	4	13	11	6	4.5	
San Jose	141	78	88	29.90	30.05	.....	57.7	+ 1.0	82	19	69	38	4	47	33	....	....	....	0.46	....	4	....	nw.	...	.....	...	12	10	8	4.5	
Southeast Farallon	30	9	17	30.03	30.08	....	52.7	....	60	20	55	47	1	51	11	....	....	....	0.24	....	3	12,206	nw.	44	nw.	16	7	12	11	6.2	
S. Pac. Coast Reg.							59.7	+ 1.6										70	0.33	– 1.0										4.3	
Fresno	330	67	70	29.65	30.01	+ .02	62.3	+ 1.1	83	21	74	40	4	50	32	54	47	47	0.69	– 0.6	4	3,758	nw.	17	nw.	5	23	2	5	3.2	
Los Angeles	338	116	123	29.64	30.01	+ .02	59.8	+ 2.2	85	8	68	47	3	52	30	54	50	78	0.16	– 1.2	4	3,854	sw.	23	sw.	3	9	8	13	3.9	
San Diego	87	94	102	29.92	30.01	+ .02	59.4	+ 1.2	75	21	65	43	4	54	22	54	50	75	0.13	– 0.6	4	4,235	nw.	22	nw.	22	24	6	0	2.8	
San Luis Obispo	201	47	54	29.84	30.06	+ .01	57.2	+ 2.0	86	8	66	38	3	48	34	52	49	80	0.34	– 1.6	3	3,977	nw.	24	ne.	8	12	7	11	5.2	
West Indies.																															
Grand Turk	11	6	20	29.99	30.00	....	77.2	....	87	*	84	59	5	70	....	....	....	...	0.05	....	2	....	se.	...	.....	...	...	...	...	...	
San Juan	82	48	90	29.91	29.99	+ .01	76.4	– 0.9	89	2	82	66	6	70	20	71	68	75	0.94	– 2.6	11	7,663	e.	29	e.	21	20	7	3	3.1	
Panama.																															
Ancon	74	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
Naos	40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

TABLE II.—*Climatological record of cooperative observers, April, 1907.*

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Alabama.	°	°	°	*Ins.*	*Ins.*
Ashville	80	27	55.4	6.19	T.
Auburn	80	32	59.1	7.89	
Bermuda	85	32	61.2	7.66	
Boligee	82	30	60.3	7.12	
Camp Hill	89	30	61.2	6.54	
Cedar Bluff	.....	.....	.....	3.71	
Citronelle	85	34	63.6	9.10	
Clanton	83	30	58.4	5.14	
Cordova	83	26	57.4	7.53	
Daphne	81	42	64.9	......	
Decatur	84	26	54.0	3.24	
Demopolis	.....	.....	.....	8.50	
Eufaula	82	34	58.8	8.22	
Flomaton	87	34	62.4	7.12	
Florence	82	26	54.2	5.15	
Fort Deposit	87	34	61.0	6.82	
Gadsden	81	28	56.8	4.54	
Goodwater	82	29	58.7	6.77	
Greensboro	83	35	60.4	9.71	
Hamilton	82[c]	25[e]	55.6[e]	5.07	
Highland Home	85	35	61.2	6.19	
Livingston	85	33	59.0	8.84	
Lock No. 4	31	29	56.2	6.77	
Lucy	86	30	62.6	6.40	
Madison Station	80	26	54.6	3.86	
Maplegrove	80	27	54.0	3.69	
Newbern	85	30	60.2	9.37	
Oneonta	80	26	54.4	5.13	T.
Opelika	85	30	59.6	7.16	
Prattville	85	30	60.2	6.84	
Pushmataha	85	31	59.4	5.53	
Riverton	84	24	52.2	5.20	T.
Scottsboro	78	27	53.7	3.35	
Selma	87	32	60.7	5.73	
Spring Hill	84	40	65.2	11.40	
Talladega	85	31	59.4	7.68	
Thomasville	84	33	59.8	7.32	
Tuscaloosa	82	30	57.0	6.64	
Tuscumbia	82	30	54.4	3.51	
Tuskegee	86	33	60.8	6.27	
Union Springs	85	34	60.1	8.30	
Uniontown	83	31	60.8	7.90	
Valleyhead	80	24	52.1	4.60	
Wetumpka	85	31	60.6	6.31	
Alaska.					
Copper Center	68	–11	27.8	0.00	
Juneau	63	22	42.2	3.10	
Killisnoo	58	28	40.6	1.35	
Sitka	62	28	40.6	2.16	
Skagway	62	21	40.8	1.08	
Teikhill	58	–18	30.3	0.07	T.
Tonsina	61	–21	29.3	0.00	
Arizona.					
Allaire Ranch	.....	.....	.....	0.14	
Aztec	104	48	73.8	0.00	
Benson	92	34	62.8	0.11	
Arizona—Cont'd.					
Bisbee	84	33	59.2	1.03	
Bonita	.....	.....	.....	0.50	
Bowie	95	30	63.2	0.07	
Buckeye	101	35	67.4	0.30	
Casa Grande	102	29	69.3	0.00	
Chiarsons Mill	64	14	38.9	3.24	3.0
Clifton	.....	.....	.....	0.94	
Cline	91	33	61.4	1.11	
Cochise *1	85	38	66.8	0.10	
Columbia	92	35	64.4	0.90	
Congress	90	42	65.2	1.25	
Douglas	92	32	62.0	0.21	
Dudleyville	93	31	63.1	0.24	
Duncan	91	28	58.6	0.17	
Fish Creek	.....	.....	.....	0.28	
Fort Apache	89	27	58.2	2.07	
Fort Huachuca	96	38	61.7	T.	
Fort Mohave	104	45	73.4	0.20	
Fredonia	85	24	52.5	1.47	
Gilabend	102	43	71.4	0.00	
Globe	90	36	61.6	0.21	
Grand Canyon	76	20	51.1	0.58	
Granterville	91	30	59.2	0.46	
Greer	.....	.....	.....	1.35	4.0
Holbrook	88	24	56.6	0.85	2.0
Huachuca Reservoir	.....	.....	.....	1.77	
Jerome	86	32	59.6	1.90	
Keams Canyon	79	21	49.6	0.63	1.5
Kingman	91	29	59.3	0.28	
Maricopa	104	40	69.3	0.60	
Mesa	99	38	68.2	0.22	
Mohawk Summit	96	60	77.3	0.00	
Natural Bridge	.....	.....	.....	1.04	
Nutrioso	.....	.....	.....	1.00	4.0
Oracle	84	40	61.3	0.53	
Parker	105	36	69.2	0.00	
Phoenix (Ex. Farm)	98	37	67.2	0.40	
Picacho	98	58	78.2	0.00	
Pinal Ranch	.....	.....	.....	0.82	
Pinto	.....	.....	.....	0.80	
Roosevelt	92	38	60.6	0.44	
St. Michaels	78	22	47.6	0.74	2.0
San Carlos	94	30	62.7	0.70	
San Simon	95	28	61.8	0.06	
Seligman	84	21	51.6	0.60	
Sentinel	105	43	72.6	0.00	
Show Low	.....	.....	.....	1.16	6.0
Silverbell	94	45	70.2	T.	
Tempe	98	36	66.8	0.29	
Thatcher	92	31	60.4	0.38	
Tombstone	86	35	61.6	0.23	
Tucson	96	35	65.2	0.15	
Upper San Pedro	92	31	59.2	0.17	
Vail	99	51	75.1	0.00	
Walnut Grove	.....	.....	.....	0.20	
Willcox	89	31	58.4	0.55	
Arizona—Cont'd.					
Williams	.....	.....	.....	0.71	3.0
Yarnell	.....	.....	.....	1.04	
Young	88	23	52.2	0.81	
Arkansas.					
Alicia	85	27	53.6	5.73	
Amity	82	32	56.3	5.62	
Arkadelphia	84	31	56.3	5.44	
Arkansas City	.....	.....	.....	5.90	
Batesville	84	30	54.9	8.09	
Beebranch	83	33	54.5	5.10	
Benton	88	34[g]	56.2[d]	5.28	
Boonville	83[e]	35[e]	56.4[e]	5.20	
Brinkley	89	31	56.1	6.86	
Camden	84	34	57.8	5.72	
Center Point	85	35	58.5	4.69	
Conway	84	32	54.6	4.73	
Corning	85	28	53.4	4.36	
Des Arc	87	32	55.7	5.87	
Dodd City	83	25	53.1	3.38	
Dutton	75	29	51.6	8.99	
Eldorado	86	34	59.0	6.24	
Eureka Springs	79	30	52.2	5.47	
Fayetteville	76	30	53.0	5.76	
Forrest City	84	31	53.6	4.64	
Hardy	82	29	52.2	3.93	
Harrison	82	24	49.3	5.93	
Heber	76[e]	32[f]	52.2[i]	......	
Helena	85	36	56.3	5.70	
Hope	86	37	58.8	5.34	
Hot Springs	82	30	55.0	5.81	
Jonesboro	86	27	52.7	6.82	
Junction	86	30	58.2	8.06	
La Crosse	82	31	53.4	6.39	
Lewisville	87	36	58.3	5.09	
Lutherville	84	30	54.6	3.92	
Malvern	81	31	53.1	5.35	
Mammoth Springs	83	24[e]	51.6[b]	4.14	
Marvell	84	31	55.6	6.47	
Mena	79	35	56.2	4.27	
Montrose	82[c]	31[c]	57.3[e]	......	
Mossville	74[e]	25[e]	50.0[e]	8.24	
Mount Nebo	79	32	52.2	4.76	
Newport	85	30	53.8	7.76	
Ozark	87	35	55.8	4.25	
Pinebluff	84	34	55.9	5.82	
Pocahontas	84	29	54.7	4.38	
Pond	76	28	52.4	4.17	
Prescott	84	35	56.5	4.68	
Princeton	85	29	57.0	5.63	
Rogers	77	29	52.6	4.23	
Russellville	84	32	53.9	3.29	
Spielerville	85	35	55.7	3.44	
Stuttgart	83	31	55.4	6.20	
Texarkana	86	43	61.2	5.00	
Warren	87	31	57.2	6.35	
Wiggs	84	28	55.0	5.73	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Arkansas—Cont'd.	°	°	°	*Ins.*	*Ins.*
Winchester	84	31	57.2	5.21	
California.					
Alturas	73	24	48.6	0.39	
Angiola	87	30	53.9	0.50	
Auburn	81	41	59.4	2.03	
Azusa	88	39	58.1	0.38	
Bagdad	97	52	73.0	0.00	
Bakersfield	87	35	60.3	0.50	
Bear Valley				3.16	7.0
Berkeley	81	41	57.4	0.36	
Bishop	91	30	57.1	0.00	
Blocksburg	77	30	53.6	3.97	
Blue Canyon	85	20	52.4	2.50	5.0
Bowman				3.17	17.2
Branscomb	84	32	51.6	5.04	
Bridgeport					T.
Brush Creek	78	32	54.6	3.93	
Butte Valley				3.94	5.0
Calexico	99	46	70.6	0.00	
Campbell	79	37	56.4	0.42	
Campo				0.25	
Cedarville	74	25	48.3	0.43	1.0
Chico	84	40	60.5	1.37	
Claremont	91	40	59.1	0.47	
Cloverdale	89	37	59.7	0.90	
Colfax	82	25	53.8	2.43	
Colusa	78	39	60.2	0.64	
Crescent City	79	35	51.6	4.23	
Crockers				2.50	T.
Cuyamaca	68	27	44.6	1.71	1.0
Delta	92	34	60.4	2.25	
Dimond				0.47	
Dobbins				2.71	
Durham	82	42	60.6	1.38	
Elcajon	88	37	60.6	0.44	
Electra	83	45	62.3	1.48	
Elmwood	83	40	59.8	T.	
Elsinore	92	32	61.4	0.07	
Emigrant Gap	78	20	44.8	3.20	10.0
Escondido	89	32	59.9	0.43	
Folsom	83	43	61.8	0.94	
Fordyce				3.37	25.0
Fort Ross				1.36	
Georgetown	76	33	54.3	2.45	
Gold Run	85	30	51.2	0.38	
Grass Valley				2.17	
Greenville	75	22	49.6	2.57	3.0
Groveland				2.38	
Healdsburg	91	36	60.4	0.83	
Heber	105	42	72.0	0.00	
Hollister	83	40	57.5	0.23	
Idyllwild	79	27	49.0	0.89	1.5
Indio	103	47	73.8	0.00	
Iowa Hill	79	36	55.8	2.30	
Isabella				0.31	
Jamestown	81	34	57.6	2.00	
Kennedy Gold Mine				1.19	
Kentfield				2.08	
Kernville				0.18	
Laporte	68	24	45.2	5.43	20.5
Legrande	87	37	59.6	0.62	
Lemoncove	86	38	65.0	1.81	
Lick Observatory	66	28	49.2	1.14	
Livermore	84	39	59.5	0.47	
Lodi	79	40	59.2	0.15	
Lone Pine	85	34	58.2	0.28	
Los Gatos	81	39	58.3	0.42	
Lowe Observatory				1.90	
Magalia	77	33	51.6	3.09	
Mammoth	108	45	72.2	0.00	
Marysville	84	47	66.1	1.00	
Merced	82	40	61.2	1.05	
Mercury				1.30	
Mills College				0.49	
Milo				4.00	
Milton (near)	78	40	58.8	0.55	
Mohave	88	40	64.1	0.00	
Mokelumne Hill	77	38	57.3	1.45	
Mono Ranch	81	30	53.4	0.21	
Montague	79	32	52.2	0.73	
Monterio	82	30	54.5	2.05	
Monumental	78	29	49.2	11.34	6.0
Mount St. Helena				2.95	
Napa	86	39	58.6	0.42	
Needles	97	34	65.6	0.00	
Nevada City	81	30	53.3	2.14	
New Castle	81	38	59.6	1.35	
Newman	86[e]	40[e]	63.3[e]	0.03	
Niles	80	40	58.8	0.77	
Nimshew	78	32	54.2	2.94	T.
North Bloomfield	79	29	53.0	2.93	T.
Oakland	82	41	59.1	0.18	
Ojai Valley	84	37	57.9	0.38	
Orland	85	39	60.2	0.84	
Orleans	95	36	62.0	5.33	
Oroville (near)	85	45	61.8	1.69	
Ozena				0.00	
Palermo	85	41	61.0	1.82	
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
Pilot Creek				2.63	T.
Pine Crest	81	42	57.4	0.48	
Placerville	78	34	55.2	1.96	
Point Lobos	70	48	58.4	0.13	
Porterville	85	39	63.7	1.19	
Poway	89	35	62.4	0.30	
Priest Valley				0.43	
Quincy	71	23	47.8	2.72	3.0
Redding	81	40	61.6	2.61	
Redlands	91	39	59.6	0.47	
Reedley	86	40	62.7	0.40	
Represa				1.13	
Rialto	91	42	59.8	0.96	
Riverside	93	38	61.0	0.14	
Rocklin	82	41	60.7	1.10	
Rohnerville	66[h]	36[h]	50.4[h]	3.05	
Sacramento	80	45	61.0	0.31	
Salinas	83	43	60.1	0.09	
San Bernardino	94	37	61.4	0.16	
San Jacinto	93	36	60.6	0.04	
San Miguel Island				0.06	
Santa Barbara	80	42	58.2	0.27	
Santa Clara College	82	38	58.0	0.44	
Santa Cruz	86	37	57.6	0.10	
Santa Maria	82	39	58.9	0.23	
Santa Monica	70	42	55.8	0.04	
Santa Rosa	88	33	56.4	0.34	
Sansalito				0.40	
Shasta	88	31	64.0	2.94	
Sierra Madre	85	46	59.0	1.50	
Sisson	80	30	49.8	0.49	4.0
Sonoma	87[f]	36[f]	58.6[f]	0.35	
Sonora	79	34	57.5	2.27	
Sterling	72	32	51.6	3.60	
Stockton	78	45	60.3	0.10	
Storey	81	36	58.2	1.11	
Summerdale	70	25	46.8	3.27	1.0
Summit	59	6	36.6	2.66	21.0
Susanville	76	29	51.0	1.14	
Tamarack	65	9	37.0	2.60	15.0
Truckee	62	22	43.6	0.00	
Tulare	84	40	61.5	0.43	
Tustin (near)				0.57	
Ukiah	89	32	58.2	1.61	
Upperlake	85	36	58.8	0.88	
Upper Mattole				4.58	
Vacaville	83	35	59.1	0.48	
Visalia	85	34	61.1	0.32	
Wasco	95	28	61.2		
Wasioja				0.06	
Westpoint				1.71	
West Saticoy				0.84	
Wheatland	80	41	60.3	1.18	
Willetts				2.80	
Willows	79	40	59.2	0.76	
Woodleaf				3.65	
Woodside	77	39	56.9	0.32	
Yosemite	83	28	52.5	1.50	
Yreka				1.59	
Zenia	74	28	49.8	4.22	T.
Colorado.					
Akron				1.74	
Antelope Springs	63	9	35.3		3.1
Arriba	80	15	43.0	2.22	13.0
Ashcroft	65	0	35.7	1.82	6.0
Boulder	80	14	46.8	3.59	28.5
Breckenridge	62	−7	31.0	3.98	50.0
Buena Vista	70	−6	41.4	1.24	12.5
Burlington	86	13	44.8		
Calhan	73	11	41.3	2.96	24.5
Canyon	86	19	50.3	1.78	17.4
Cascade				2.07	17.4
Castlerock	74	7	39.6	1.43	16.8
Cheyenne Wells	86	14	48.8	0.72	5.0
Chromo	77	17	42.8	3.49	11.0
Clearview	66	6	36.7	3.17	34.0
Collbran	78	20	48.5	0.69	2.5
Colorado Springs	78	12	44.4	1.57	10.5
Cope	84	18	45.0		
Corona	46	−3	22.8	7.90	70.0
Cripplecreek				1.80	17.0
Delta	84	24	51.6	0.78	T.
Dunkley	66	9	38.2	2.32	17.0
Eads	87	13	48.0	1.65	9.0
Eagle	73	13	43.3	0.82	T.
Eureka				2.14	21.0
Fort Collins	80	6	42.6	2.80	29.8
Fort Morgan	86	18	47.1	0.48	
Fowler				2.44	10.5
Frances	60	4	36.0	5.50	37.0
Gladstone				3.44	49.5
Glenwood	76	16	46.1	0.39	
Gothic	55	−9	33.8	3.17	41.0
Grand Valley	80	22	50.6	68.0	1.0
Grover				1.05	7.8
Gunnison	77	4	40.6	1.00	7.0
Hahns Peak	55	5	32.0	3.00	33.0
Humps	80	10	42.5	2.38	17.5
Colorado—Cont'd.	°	°	°	*Ins.*	*Ins.*
Hoehne	85	7	45.4	1.86	7.0
Holly	91	11	54.0	1.35	10.0
Holyoke (near)	88	14	44.1	0.66	8.0
Idaho Springs	68	6	40.4	1.69	15.5
Lake City	70	4	41.6	1.32	6.0
Lamar	87	15	51.6	2.72	20.0
Laporte				3.54	37.5
Las Animas	88	18	50.8	2.00	
Lay	74	12	41.4	1.27	8.0
Leroy	86	16	43.2	0.97	9.4
Longs Peak	60	−10	32.4	4.39	52.0
Lujane	75	16	48.0	1.13	4.5
Manassa	76	11	42.6	0.45	3.5
Mancos	76	14	46.0	1.97	6.0
Meeker	76	13	43.8	0.99	5.5
Montrose				0.54	
Moraine	64	−5	34.2	2.51	28.3
Pagoda	74	16	43.0	1.68	3.0
Pagosa Springs	75	9	43.2	2.05	9.0
Paonia	81	20	50.6	1.49	9.0
Platte Canyon				2.70	19.0
Power House	78	15	45.3	1.89	4.5
Rangely				0.49	
River Portal	77	18	49.0	1.78	2.0
Rockyford	88	21	49.8	1.84	11.0
Saguache	76	9	41.7	0.78	9.0
Salida	75	1	45.0	2.36	17.5
San Luis	77	15	44.8	0.25	2.5
Santa Clara	77	8	42.4	4.17	46.0
Sapinero	67	1	40.4	2.68	21.3
Sheridan Lake	98	9	49.0	0.86	8.0
Silt	78	19	50.0	0.24	1.5
Silverton	65	−5	35.6	3.62	24.5
Stonewall				2.44	30.0
Terminal Dam				2.02	15.0
Trinidad	84	18	48.4	2.23	10.0
Victor	62	6	36.5	1.44	14.2
Vilas				1.55	4.0
Wagon Wheel	72	1	38.1	1.54	17.0
Walden	82	3	44.5	2.58	26.0
Westcliffe	70	−5	41.8	2.20	31.0
Whitepine	57	−6	32.2	2.96	36.0
Wray	88	20	45.3	0.94	6.0
Yuma				0.94	T.
Connecticut.					
Bridgeport	69	25	43.8	3.22	7.1
Canton	72	20	41.4	2.30	9.0
Colchester	69	20	42.0	3.55	6.5
Falls Village				2.18	17.0
Hawleyville	72	21	41.8	3.60	16.0
Lake Konomoc				2.72	
New London	67	24	43.2	2.51	5.0
North Grosvenor Dale	73	22	42.0	2.26	
Norwalk	71	23	42.6	2.99	9.0
Southington	70	21	42.8	2.75	12.0
South Manchester				2.96	10.0
Storrs	70	21	41.4	2.40	
Voluntown				3.11	4.0
Wallingford	79	22	47.1	3.95	6.0
Waterbury	71	23	43.4	2.77	14.0
West Cornwall	68	18	37.6	3.58	27.8
West Simsbury				2.42	11.0
Delaware.					
Delaware City				3.95	T.
Dover	80	24	47.1	4.69	T.
Milford	83	23	48.8	4.59	T.
Millsboro	81	25	47.0	2.83	1.0
Newark	78	23	47.2	3.23	T.
Seaford	79	23	47.1	3.90	2.0
District of Columbia.					
West Washington	84	20	46.8	4.08	0.5
Florida.					
Apalachicola	82	42	66.0	6.92	
Archer	90	31	66.2	4.12	
Avon Park	95	44	72.0	1.27	
Bartow	97	38	71.4	T.	
Bonifay	84	35	64.3	6.53	
Brooksville *	93	40	69.5		
Carrabelle	83	38	64.4	5.95	
Clermont	93	45	72.3	1.68	
De Funiak	84	36	64.0	5.21	
Eustis	93	35	69.6	2.05	
Federal Point	88	41	67.4	3.23	
Fenholloway	88	30	64.0	7.03	
Fernandina	84	40	64.2	8.76	
Flamingo	94	51	73.2	0.22	
Fort Meade	94	37	70.7	0.72	
Fort Myers	89	45	70.8	0.57	
Fort Pierce	94	40	70.5	1.19	
Gainesville	89	40	66.3	3.08	
Grasmere	91	44	70.0		
Huntington	90	39	67.8	2.62	
Hypoluxo	91	46	72.1	0.50	
Inverness	91	37	68.0	1.50	
Jasper	86	33	64.6	7.04	
Johnstown	89	27	64.3	3.85	
Kissimmee	93	42	70.8	1.66	
Lake City	84	34	64.5	5.57	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	*Ins.*	*Ins.*
Florida—Cont'd.					
Macclenny	86	31	63.8	6.70	
Madison	89[c]	38[j]	65.8[f]	4.84	
Malabar	93	42	70.2	3.43	
Manatee	90	42	69.8	1.84	
Marianna	85[c]	33[d]	62.6[d]	4.68	
Merritts Island	88	44	70.3	1.87	
Miami	88	47	73.4	0.73	
Molino	86	28	61.2	10.11	
Monticello	85	38[i]	61.6[d]	10.40	
Mount Pleasant	87	32	65.8	9.07	
New Smyrna	92	41	68.6	2.15	
Ocala	92	38	68.7	2.55	
Orange City	96	34	69.5	0.91	
Orlando	94	41	70.9	2.20	
Panasoffkee	92	33	67.6	1.26	
Rockwell	92[d]	29[d]	67.2[d]	3.37	
St. Andrew	81	32	64.6	6.35	
St. Augustine	89	39	66.0	3.52	
St. Leo	94	42	70.4	1.66	
Switzerland	87	36	65.6	3.61	
Tallahassee	83	38	64.4	9.20	
Tarpon Springs	89	34	68.0	1.33	
Titusville	95	37	68.0	2.02	
Wausau	87	37	63.6	6.70	
Georgia.					
Adairsville	79	28	54.1	3.89	T.
Albany	87	34	63.1	7.99	
Americus	85	33	58.8	6.83	
Athens	79	32	54.2	4.84	
Bainbridge	89	31	63.6	4.92	
Blakely	89	33	64.2	12.57	
Brunswick	86	35	62.4	5.82	
Butler	...	...	...	10.15	
Camak	83	28	55.4	4.22	
Canton	...	...	...	4.35	T.
Carlton	...	...	...	4.34	
Carrollton	78	28	53.9	2.82	
Clayton	79	24	52.1	4.92	T.
Columbus	86	35	60.8	7.33	
Cordele	80	33	60.3	8.05	
Covington	81	28	57.3	4.94	
Cuthbert[f]	84	33	62.8	...	
Dahlonega	81	26	52.8	3.72	T.
Diamond	79	24	51.2	3.85	T.
Dudley	83	31	59.7	6.44	
Eastman	91	34	61.0	4.76	
Eatonton	85	27	57.6	4.01	
Elberton	82	29	56.2	3.88	
Experiment	78	30	56.6	5.41	
Fitzgerald	89	33	62.0	6.48	
Fleming	85	28	60.3	5.75	
Forsyth	...	...	...	5.08	
Fort Gaines	87	35	61.9	9.28	
Gainesville	77	31	52.4	4.15	
Gillsville	80	28	54.8	4.09	
Glenville	86	33	59.9	5.52	
Greenbush	76	26	54.4	4.03	
Greensboro	85	25	56.0	4.05	
Griffin	82	29	56.6	5.72	
Harrison	85	26	57.6	7.23	
Helena	86	32	60.6	5.04	
Lisbon	87	25	56.7	2.89	
Lost Mountain	81	28	54.0	3.88	T.
Louisville	83	29	58.2	5.05	
Lumpkin	83	29	58.8	9.33	
Marshallville	87	30	59.6	8.23	
Mauzy	88	32	64.4	5.95	
Milledgeville	87	29	58.9	5.32	
Millen	89	27	58.0	5.60	
Monticello	82	30	57.6	5.04	
Morgan	84	35	61.6	10.52	
Newnan	83	30	55.4	6.13	
Point Peter	82	24	55.3	4.23	
Putnam	86	30	60.2	7.23	
Quitman	86	33	63.1	8.41	
Ramsey	80	27	55.0	3.11	T.
Resaca				2.68	T.
Rome	85	27	54.3	3.82	T.
St. George	85	32	63.2	7.27	
St. Marys	86	34	63.0	5.67	
Screven	88	30	64.0	3.85	
Statesboro	82	30	58.7	4.02	
Talbotton	82	29	58.6	8.15	
Tallapoosa	83	32	57.7	4.90	
Toccoa	78	27	52.0	6.93	
Valdosta	89	31	63.7	8.79	
Valona	84	28	61.4	5.68	
Washington	80	30	55.0	4.40	
Waycross	93	34	63.0	4.08	
Waynesboro	85	29	57.7	5.64	
Westpoint	82	31	57.4	7.72	
Woodbury	80	28	56.1	6.42	
Idaho.					
Albion	75	18	46.2	2.25	0.8
American Falls	75	19	46.8	2.08	...
Blackfoot	73	17	45.2	0.57	...
Buhl	74	25	49.6	1.42	0.5
Burke	63	10	35.3	4.15	23.5
Idaho—Cont'd.					
Caldwell	77	24	50.3	0.65	...
Cambridge	74	26	49.0	1.10	...
Chesterfield	68	19	42.9	0.30	T.
Dent	81	22	47.5	1.89	...
Dewey	66	20	39.9	0.81	3.0
Driggs	68	13	39.0	1.78	5.0
Ellerslie	74	25	48.0	1.06	...
Emmett	76	24	49.4	0.56	
Forney	70	10	39.2	1.99	13.3
Garnet	80	29	54.2	0.57	
Grace	70	21	45.2	1.16	0.5
Hot Springs	80	25	53.2	0.82	...
Idaho Falls	76	18	45.4	0.72	1.0
Lake	62	10	37.2	0.80	8.0
Lakeview	69	20	43.6	1.50	1.0
Landore	61	14	36.4	2.83	25.5
Lardo	63	12	36.2	1.51	7.7
Lost River	68	10	42.0	0.57	1.0
Meadows	72	19	42.5	0.99	5.0
Milner	75	21	47.8	1.82	1.0
Moscow	72	23	45.5	0.62	...
Mountain Home	76	19	48.6	1.47	...
Murray	73	15	41.6	2.75	11.0
Murtaugh	74[e]	17[e]	45.4[e]	1.65	2.5
Nevens Ranch	...	...	...	2.50	...
Oakley	75	20	48.2	2.59	0.4
Orofino	80	25	49.8	1.89	...
Payette	75	25	49.6	0.47	T.
Pollock	75	27	50.0	1.20	...
Poplars	...	...	...	0.68	T.
Porthill	71	18	43.6	1.30	
Roosevelt	...	...	...	...	...
Rupert	77	22	47.6	1.84	T.
St. Maries	74	34	45.0	1.30	
Salem	...	...	...	0.76	1.5
Salmon	76	16	44.0	0.48	1.0
Standrod	...	...	...	1.85	7.0
Twin Falls	75	19	48.6	0.97	...
Vernon	72	16	42.8	0.41	T.
Illinois.					
Albion	78	24	46.8	3.51	T.
Aledo	74	21	44.6	2.27	0.2
Alexander	77	23	45.0	2.53	T.
Antioch	69	18	39.0	0.95	2.0
Ashton	72	19	40.8	1.95	1.0
Astoria	77	24	44.2	3.10	T
Aurora	73	18	40.4	2.00	1.0
Beardstown	...	...	...	2.60	...
Benton	83	26	48.8	1.82	
Bloomington	77	23	44.0	3.54	T.
Bushnell	75	23	45.3	3.17	T
Cambridge	75	22	42.7	2.04	1.0
Carlinville	77	23	45.9	3.21	T.
Carlyle	...	...	...	3.95	
Carrollton	81	22	46.2	3.13	T.
Charleston	77	22	43.8	2.35	T.
Chester	82	29	50.0	2.38	
Coatsburg	80	21	45.0	2.59	T.
Cobden	81	26	49.6	3.11	
Colchester	77	23	44.9	1.86	0.5
Decatur	78	24	43.0	2.94	T.
Dixon	73	19	39.8	2.11	T.
Dwight	76	19	42.2	2.56	1.0
Elgin	72[d]	20[d]	40.4[d]	2.21	1.0
Equality	83	26	50.5	3.25	T.
Flora	79	25	46.4	3.63	T.
Friendgrove	75	25	46.2	3.48	T.
Galva	74	19	40.8	3.16	2.5
Grafton	...	...	...	3.14	T.
Greenville	80	24	46.0	2.73	T.
Griggsville	79	25	46.7	3.25	T.
Halfway	80	26	48.5	3.22	
Havana	80	25	47.2	3.11	T.
Henry	74	22	43.9	2.79	4.0
Hillsboro	79	25	44.4	2.78	T.
Hoopeston	76	21	42.6	2.90	1.8
Joliet	72	22	41.0	2.28	1.1
Kishwaukee	68	20	40.7	2.34	3.5
Knoxville	76	23	44.6	0.29	0.2
Lagrange	72	20	39.8	2.45	1.0
Laharpe	75	24	44.8	2.60	1.0
Lanark	72	14	40.8	2.50	3.0
Lincoln	76	27	44.2	2.52	T.
Loami	...	...	...	2.61	T.
McLeansboro	81	25	46.4	2.16	
Martinsville	76	23	43.6	2.45	T.
Martinton	75	21	41.4	2.56	T.
Mascoutah	81	26	48.0	3.85	T.
Minonk	76	20	42.8	2.59	0.2
Monmouth	78	22	45.3	3.19	0.2
Morrison	72	21	42.4	1.74	2.0
Morrisonville	77	24	44.0	2.60	
Mount Carmel	...	...	...	3.48	0.5
Mount Vernon	80	26	47.5	3.22	
New Burnside	81	25	49.0	2.[illegible]	T.
Olney	78	24	45.4	3.92	0.5
Ottawa	75	23	43.8	2.69	T.
Palestine	78	24	45.7	3.54	T.
Illinois—Cont'd.					
Pana	74	24	44.0	3.02	T.
Paris	78	22	42.7	2.80	...
Peoria	...	...	...	2.82	
Philo	77	22	41.8	2.42	T.
Pontiac	76	23	43.5	3.09	T.
Rantoul	79	21	40.4	2.19	T.
Raum	81	25	49.4	3.84	
Riley	68	20	39.4	3.09	1.2
Robinson	78	24	45.0	4.34	0.1
Rockford	70	21	39.3	2.78	1.5
Rushville	76	25	46.0	3.99	T.
St. Charles	71	20	40.0	2.16	3.0
St. John	83	26	48.9	2.50	
Streator	74	23	41.6	2.92	0.5
Sullivan	79	22	44.8	2.43	T.
Sycamore	71	19	39.2	2.66	1.5
Tilden	78	24	47.8	3.73	T.
Tiskilwa	76	20	43.2	2.83	1.5
Tuscola	73	19	42.5	2.50	
Urbana	77	22	42.6	2.34	T.
Vernon	79	23	46.7	3.45	T.
Walnut	75	21	43.8	2.57	1.2
Warsaw	...	...	...	2.48	
Windsor	76	23	44.0	2.22	T.
Winnebago	71	18	40.2	3.46	5.0
Yorkville	74	20	41.2	1.55	0.5
Zion	73	11	40.4	1.94	4.0
Indiana.					
Anderson	75	22	42.3	2.76	5.7
Angola	73	18	39.9	2.95	6.3
Auburn	74	17	38.5	1.91	...
Bedford	62	24	43.0	2.25	
Bloomington	74	24	45.1	3.11	0.5
Bluffton	77	21	41.8	2.49	0.1
Butlerville	78	23	44.3	4.15	0.8
Cambridge City	75	19	40.8	2.81	...
Columbus	77	22	44.8	2.74	T.
Connersville	78	20	43.2	2.42	T
Crawfordsville	78[c]	20[b]	43.3[c]	...	...
Delphi	80	19	41.4	1.91	2.5
Elkhart	71	21	41.2	2.91	0.5
Eminence	76	22	44.0	2.71	1.4
Farmersburg	77	23	44.6	3.09	0.4
Farmland	77	21	41.6	2.38	...
Fort Wayne	78	20	42.0	2.27	0.5
Franklin	79	22	43.6	2.66	1.0
Greenfield	76	22	43.8	2.43	2.5
Greensburg	77	22	43.8	2.51	1.5
Hammond	67	25	40.6	2.57	3.0
Holland	81	23	48.2	3.01	T.
Huntington	77	22	42.4	2.15	4.5
Jeffersonville	82	27	48.6	2.61	T.
Knox	73	19	41.0	3.57	1.4
Kokomo	77	20	41.9	2.08	1.5
Lafayette	76	21	41.8	2.27	2.5
Laporte	70	19	38.8	4.01	2.9
Lima	71	20	39.0	3.26	1.0
Logansport	78	20	42.4	1.71	T.
Madison	83	25	47.4	2.58	1.5
Marengo	80	23	46.1	3.59	0.1
Marion	79	19	43.2	2.64	5.3
Markle	75	19	41.7	2.85	T.
Mauzy	75	20	41.6	2.82	2.8
Moores Hill	78	22	44.2	4.39	5.0
Mount Vernon	83	25	47.2	3.20	T.
Northfield	75	18	40.6	2.23	1.0
Paoli	79	22	46.2	3.89	1.5
Plymouth	71	20	41.0	3.38	T.
Princeton	77	23	46.6	3.10	T.
Rensselaer	76	20	43.4	3.42	2.0
Richmond	79	19	42.4	2.57	2.6
Rochester	69	21	41.4	2.32	T.
Rockville	75	21	43.6	2.47	T.
Rome	86	27	49.9	2.39	T.
Salamonia	77	20	41.8	2.02	...
Salem	78	22	45.2	3.25	T.
Scottsburg	80	27	47.6	2.68	T.
Shelbyville	76	22	43.6	2.43	0.5
South Bend	70	17	39.0	3.76	6.5
Syracuse	74	20	40.2	3.16	T.
Terre Haute	76	24	45.8	3.38	T.
Veedersburg	75	20	43.4	1.80	1.1
Vincennes	73	23	44.8	3.75	T.
Washington	76	23	45.2	3.58	T.
Worthington	76	22	45.5	2.89	T.
Indian Territory.					
Ada	86	35	57.3	2.66	T.
Ardmore	85	35	57.3	3.61	
Calvin	...	...	...	2.61	
Chickasha	92[e]	31[e]	58.6[e]	3.30	
Durant	88	36	56.1	2.77	
Fairland	83	28	53.8	3.95	
Fort Gibson	...	...	...	6.46	
Hartshorn	83	36	57.4	3.06	
Healdton	90	31	57.0	3.01	
Idabel	83	37	58.4	5.90	
Marlow	92	34	56.2	1.73	
Muskogee	80	33	54.5	5.45	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Indian Territory—Cont'd.					
Okmulgee	88	33	55.6	3.84	
Pauls Valley	88	31	57.9	3.00	
Ravia	87	36	58.6	2.73	
South McAlester	88	35	57.3	2.92	
Tulsa	87	34	53.2	4.71	
Vinita	81ᵉ	28ᵉ	51.8ᵉ	4.54	
Wagoner	83	29	54.0	3.38	
Webbers Falls	87	33	55.6	6.05	
Iowa.					
Afton	78	16	43.0	1.92	10.7
Albia	76	16	41.8	1.18	2.0
Algona	68	13	38.8	0.76	T.
Allerton	77	17	43.8	1.59	T.
Alta	71	15	38.4	0.60	0.5
Alton	68	15	38.9	0.59	2.0
Amana	73	20	43.4	1.66	4.0
Ames	72	13	42.0	0.67	0.1
Atlantic	75	11	42.0	0.94	1.5
Audubon	74	11	42.0	0.61	1.5
Baxter	72	16	42.6	1.25	4.0
Bedford	73	16	42.6	1.83	8.2
Belleplaine	74	17	42.6	1.84	8.0
Bloomfield	77	20	44.9	2.22	1.0
Bonaparte	78	21	45.2	2.45	T.
Boone	71	17	40.4	0.83	T.
Britt	69	14	38.8	0.87	T.
Buckingham	......	......	......	0.63	......
Burlington	78	23	43.4	3.22	2.0
Carroll	73	12	39.6	0.66	0.2
Cedarfalls	......	......	......	1.29	2.5
Cedar Rapids	72	21	41.8	1.31	2.0
Chariton	76	16	42.8	1.03	1.0
Clarinda	80	17	41.7	2.01	14.0
Clearlake	67	17	38.8	1.06	
Clinton	75	21	43.6	2.56	0.5
Columbus Junction	76	21	44.6	1.55	0.5
Corning	77	13	41.6	2.28	11.0
Corydon	76	18	44.3	1.47	1.0
Creston	75	16	40.6	1.81	5.0
Cumberland	......	......	......	1.24	9.0
Decorah	68	18	40.6	0.72	......
Delaware	70	17	39.8	1.03	2.0
Denison	72	11	40.4	0.85	T.
Desoto	75	12	42.6	1.23	4.0
Dows	71	14	39.6	1.11	T.
Earlham	76	10	41.7	1.53	11.5
Elkader	73	18	41.6	0.97	T.
Elliott	73	15	42.8	2.03	10.0
Estherville	67	13	37.2	0.63	
Fayette	70	16	39.9	1.03	T
Forest City	69	17	38.0	0.73	T.
Fort Dodge	72	15	38.8	0.91	T.
Fort Madison	......	......	......	2.41	......
Galva	70	11	39.2	0.69	
Gilman	......	......	......	1.45	5.0
Grand Meadow	69	19	39.8	1.12	T.
Greenfield	75	15	40.8	1.45	......
Grinnell	71	16	43.6	2.19	6.5
Grundy Center	71	18	42.2	0.96	T.
Guthrie Center	73	11	42.2	1.03	3.0
Hampton	72	18	40.6	1.19	T.
Hancock	75	18	43.0	0.92	3.0
Harlan	75	12	42.4	0.87	2.6
Humbolt	69	14	40.6	0.81	......
Independence	69	18	41.0	0.94	T.
Indianola	74	18	42.8	1.73	7.2
Inwood	70	12	39.0	0.24	0.8
Iowa City	72	21	42.3	1.58	1.0
Iowa Falls	72	15	40.0	1.02	T
Jefferson ʲ	73	15	43.5	......	......
Keosauqua	78	22	43.4	2.40	0.5
Knoxville	78	19	44.2	1.76	4.8
Lacona	......	......	......	2.06	6.0
Larrabee	73	13	39.7	0.30	0.6
Leclaire	......	......	......	2.01	0.5
Lemars	70	11	39.5	......	T.
Lenox	76	17	42.6	1.58	7.8
Leon	76	19	43.2	1.55	1.0
Little Sioux	74	15	42.4	0.82	T.
Logan	74	15	42.0	1.22	6.8
Maple Valley	......	......	......	0.69	0.2
Marshalltown	72	16	41.2	0.87	T.
Mason City	66	18	40.0	1.14	......
Massena	79	11	42.0	1.68	10.8
Mountayr	78	19	43.4	2.08	5.2
Mount Pleasant	78	22	45.4	2.71	T.
Mount Vernon	71	18	45.7	2.05	4.5
Murray	78	18	43.0	1.35	
Muscatine	......	......	......	2.22	T
Nevada	......	......	......	0.44	T.
New Hampton	64	18	39.0	0.85	T.
Newton	71	18	43.4	1.49	8.0
Northwood	64	17	38.8	1.03	0.4
Odebolt	75	14	40.8	0.67	......
Ogden	72	14	42.2	0.83	......
Olin	71	20	43.0	2.37	5.0
Onawa	76	18	43.0	0.74	3.0
Osage	67	19	39.2	1.24	
Iowa—Cont'd.					
Oskaloosa	76	16	43.4	1.47	2.0
Ottumwa	78	24	45.6	1.71	T.
Pacific Junction	78	16	43.4	2.71	6.3
Pella	76	19	45.4	1.69	4.0
Perry	74	13	42.4	0.95	......
Plover	69	14	39.0	0.62	T.
Pocahontas	72	16	39.6	0.65	0.5
Ridgeway	72	20	40.2	1.01	0.4
Rock Rapids	70	16	36.8	1.05	0.5
Rockwell	72	15	41.8	0.96	......
Sac City	69	14	40.4	0.54	......
St. Charles	75	18	44.1	1.91	8.6
Sheldon	71	12	39.4	0.91	1.0
Sibley	69	13	35.9	0.67	0.6
Sigourney	75	19	45.2	1.99	4.0
Sioux Center	68	15	38.6	1.39	2.5
Stockport	75	20	43.8	2.33	2.0
Storm Lake	70	13	39.1	0.83	0.5
Thurman	77	17	43.6	2.31	16.0
Tipton	71	22	44.1	2.07	......
Toledo	69	18	42.2	1.40	3.0
Wapello	72ᶜ	20ᶜ	44.7ᶜ	2.21	0.5
Washington	74	19	43.4	1.69	......
Washta	74	10	39.2	0.61	1.0
Waterloo	72	20	42.2	0.94	T.
Waukee	74	15	42.4	1.58	7.7
Waverly	71	20	41.2	0.95	T.
Webster City	74	13	41.7	0.93	......
Westbend	67	14	38.8	0.51	T.
Whitten	73	15	41.9	0.92	T.
Wilton Junction	78	19	43.5	1.76	......
Winterset	75	18	43.4	1.90	8.5
Woodburn	76	13	42.9	1.78	7.0
Zearing	70ᶠ	15ᶠ	40.5ᶠ	0.90	
Kansas.					
Abilene	......	......	......	0.94	
Alton	83	12	47.7	1.20	2.0
Anthony	86	28	55.2	1.78	
Atchison	83	24	47.5	1.49	0.5
Baker	81	22	44.2	2.17	1.5
Beloit	......	......	......	0.50	......
Blue Rapids	......	......	......	1.59	1.0
Burlington	85	22	51.2	1.28	T.
Chapman	85	20	48.4	0.70	T.
Cimarron	85ᶜ	15ᶜ	48.9ᶜ	0.71	3.5
Clay Center	84	18	47.4	0.86	4.0
Colby	86	5	46.8	1.00	2.2
Coldwater	84	23	51.1	0.83	T.
Columbus	78	25	51.4	3.78	T.
Coolidge	90	9	49.2	0.70	12.0
Cottonwood Falls	84	20	50.3	0.65	0.2
Cunningham	89	21	51.3	0.45	T.
Dresden	82	14	45.2	0.75	3.2
Eldorado	82	22	51.0	1.05	T.
Ellinwood	81	18	48.1	0.75	T.
Ellsworth	86	16	47.2	0.89	2.0
Emporia	81	24	49.6	0.79	2.0
Englewood	87	24	52.8	1.36	0.2
Enterprise	87	20	48.6	1.01	T.
Eskridge	82	23	47.8	1.24	1.8
Eureka	......	......	......	1.64	T.
Fall River	84	25	51.9	2.52	T.
Farnsworth	86	15	47.8	0.70	4.8
Fort Scott	79	25	49.8	3.84	......
Frankfort	83	17	46.1	1.76	7.5
Garden City	88	18	50.4	0.91	3.0
Garnett	89	23	53.0	4.42	T.
Goodland	90	14	46.4	0.82	7.5
Gove	83	15	46.6	0.64	4.0
Greensburg	84	22	49.8	0.59	T.
Grenola	84	25	51.0	2.62	
Hanover	80	18	46.9	1.47	4.5
Harrison	81	15	44.8	1.29	6.0
Hays	87	13	45.1	0.60	2.0
Hill City	81	10	46.2	0.79	5.0
Horton	82	23	45.6	2.12	4.0
Howard	85	27	50.2	2.73	
Hugoton	90	16	49.1	1.40	7.0
Hutchinson	83	20	48.8	0.64	T.
Independence	85	27	53.0	4.27	
Jetmore	89	14	49.4	0.20	3.0
Jewell	84	15	46.0	0.78	3.0
La Crosse	87	13	47.2	0.32	3.0
Lakin	87	19	49.8	1.04	12.0
Larned	87	13	46.2	0.91	3.0
Lebanon	77	17	46.0	1.20	4.0
Lebo	83	23	48.3	0.95	T.
Liberal	88	20	52.2	2.13	9.0
Macksville	82	19	45.7	0.32	T.
McPherson	83	20	47.4	1.07	T.
Madison	85	24ᵉ	50.8ᵉ	1.26	T.
Manhattan	86	20	46.9	1.21	2.0
Manhattan Agr. College	83	19	45.8	1.35	2.0
Medicine Lodge	88	24	50.6	1.57	
Minneapolis	82	19	46.5	1.12	4.5
Moran	80	22	50.8	2.63	T.
Mounthope	......	......	......	1.00	T.
Neosho Rapids	......	......	......	0.91	0.5
Kansas—Cont'd.					
Ness City	83ᵈ	14ᵇ	47.4ᵉ	0.38	2.0
Newton	85	20	50.2	0.76	T.
Norton	84	13	45.2	0.90	8.5
Norwich	88	24	52.2	1.25	
Oberlin	......	......	......	1.57	7.5
Olathe	80	24	48.4	1.44	1.0
Osage City	82	24	48.6	2.26	T.
Oswego	82	25	52.1	3.89	
Ottawa	81	19	48.8	1.47	1.2
Paola	78	24	49.1	2.27	T.
Phillipsburg	85	19	47.6	0.65	4.3
Pleasanton	76	25	50.2	3.51	T.
Pratt	83	18	49.2	0.35	T.
Republic	81	18	45.8	1.04	2.0
Rome	86	25	52.5	2.01	
Russell	82	11	46.0	0.52	2.8
Salina	82	17	48.8	0.74	2.0
Scott	86	12	49.4	0.26	3.5
Sedan	86	26	50.6	2.59	
Toronto	84	23	49.9	2.25	
Ulysses	93ᵉ	18ᵉ	49.8ᵉ	0.85	6.5
Valley Falls	84	22	47.8	1.38	1.2
Wakeeney	83	15	47.7	0.37	2.0
Wakeeney (near)	......	......	......	0.42	2.0
Wallace	90	6	47.4	0.47	5.8
Walnut	88	24	51.8	5.94	
Winfield	85	26	52.2	2.25	
Yates Center	82	23	50.7	2.55	T.
Kentucky.					
Alpha	73	26	49.6	2.95	T.
Anchorage	81	24	46.0	2.81	0.1
Bardstown	85	25	48.3	2.42	0.5
Beattyville	85	20	48.0	3.66	T.
Beaver Dam	84	25	48.2	2.95	
Berea	83	22	48.8	2.58	0.2
Blandville	79	29	50.0	4.63	
Bowling Green	84	27	50.8	2.62	T.
Burnside	86	23	50.9	3.35	T.
Cadiz	85	27	51.1	3.67	
Calhoun	......	......	......	2.53	T.
Catlettsburg	88ᵍ	22ʰ	51.6ᵍ	2.74	1.0
Earlington	85	25	48.2	3.13	T.
Edmonton	83	23	49.2	2.14	T.
Eubanks	82	24	46.7	2.95	0.3
Falmouth	......	......	......	2.58	T.
Farmers	85	19	46.8	2.79	1.0
Frankfort	79	25	48.0	3.02	T.
Franklin	82	27	50.8	2.47	
Greensburg	85	22	47.6	2.00	T.
High Bridge	......	......	......	2.01	1.0
Hopkinsville	84	25	48.8	5.24	
Irvington	84	27	49.0	2.29	T.
Leitchfield	81	25	47.7	2.26	T.
Loretto	82	23	47.2	1.69	T.
Lynnville	81	28	51.2	4.28	T.
Manchester	84ᵈ	20ᵈ	47.6ᵈ	2.33	T.
Marion	83	26	49.7	3.32	T.
Maysville	85	21	45.4	2.90	0.5
Middlesboro	82	22	50.7	1.89	0.1
Mount Sterling	83	22	47.0	3.14	T.
Owensboro	80	28	47.0	2.58	
Owenton	86	22	46.6	3.09	0.7
Paducah	82	31	52.3	4.28	
Princeton	85	27	51.2	2.88	
Richmond	85	23	48.2	2.65	T.
St. John	82	23	45.4	2.09	
Scott	79	22	45.0	3.41	0.7
Shelby City	85	20	47.0	2.28	T.
Shelbyville	87	23	46.6	2.47	T.
Taylorsville	80	25	47.4	3.17	T.
West Liberty	86	22	48.0	2.14	
Williamsburg	82	21	48.1	2.60	T.
Williamstown	79	20	42.4	2.40	1.8
Louisiana.					
Abbeville	88	36	67.4	3.67	
Alexandria	91	35	65.0	4.15	
Amite	87	31	64.4	6.77	
Baton Rouge	88	36	65.4	7.10	
Burnside	87	35	66.2	6.65	
Calhoun	85	33	60.2	8.79	
Cameron	80	44	67.2	3.13	
Cheneyville	85	34	63.8	4.22	
Clinton	85	33	64.0	5.67	
Collinston	83	37	60.4	8.55	
Covington	85	35	64.7	10.07	
Donaldsonville	93	39	67.2	5.70	
Farmerville	85	36	61.1	7.37	
Ferriday	84	32	64.2	7.69	
Franklin	88	39	67.8	4.19	
Georgetown	88	33	63.0	4.38	
Grand Cane	85ᵇ	40ᵉ	61.1ᵉ	6.94	
Grand Coteau	86	35	66.3	7.26	
Houma	87	36	66.6	5.86	
Jennings	86	39	65.3	3.82	
Lafayette	86	35	65.3	3.98	
Lake Charles	94	39	62.4	2.89	
Lakeside	86	40	65.3	2.49	
Lawrence	87	42	67.0	2.95	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Louisiana—Cont'd.	°	°	°	*Ins.*	*Ins.*
Libertyhill	88	34	61.2	6.79	
Logansport				6.67	
Melville	87	37	65.0	7.05	
Minden	84[d]	43[c]	61.3[d]	.....	
Monroe	86	45	60.5	7.28	
Morgan City				4.82	
New Iberia	83	42	67.0	4.95	
Opelousas	90	36	66.2	4.69	
Plain Dealing	84	33	58.9	8.41	
Rayne	87	40	67.0	4.72	
Robeline	87	35	61.5	2.86	
Ruston	87	35	61.0	8.40	
St. Francisville	88	36	62.6	5.85	
Schriever	90	33	67.0	5.20	
Simmesport				4.78	
Southern University				10.85	
Sugar Experiment Station	86	45	67.1	13.38	
Sugartown	85	40	64.8	8.80	
Maine.					
Bar Harbor	60	16	39.6	5.30	28.5
Cornish	75	18	39.2	3.19	18.0
Danforth				3.05	6.0
Fairfield	68	13	39.1	3.49	15.0
Farmington	73	13	38.3	4.05	24.0
Gardiner	64	11	39.2	3.70	18.0
Greenville	64	0	33.6	3.78	15.0
Houlton	65	5	37.2	1.75	11.0
Lewiston	67	19	39.6	3.71	21.0
Madison	68	9	32.8	6.32	21.0
Mayfield	62	15	37.0	4.04	14.0
Millinocket	69	7	38.4	3.60	15.8
North Bridgton	74	15	38.3	3.80	19.0
Oquassoc	64	8	36.8	3.61	24.0
Orono	65	9	39.0	3.53	18.0
Patten	64	10	33.8	1.50	15.0
Rumford Falls	72	17	38.5	3.88	21.6
The Forks				5.23	31.0
Van Buren	64	— 3	37.2	2.30	16.0
Winslow	68	13	39.2	3.40	14.0
Maryland.					
Annapolis	80	24	47.0	4.12	0.5
Bachmans Valley	80	19	46.2	2.92	6.0
Cambridge	81	25	49.0	4.20	T.
Cheltenham	83	22	47.0	4.50	2.5
Chestertown	77	23	47.0	4.17	T.
Chewsville	77	16	46.2	1.44	T.
Clearspring	78	18	44.8	3.77	3.2
Coleman	80	24	48.2	3.14	T.
Collegepark (Md. Ex. Sta.)	84	22	48.2	2.25	T.
Cumberland	84	19	49.6	2.26	T.
Darlington	78	21	47.2	2.54	2.0
Deerpark	78	9	39.2	3.89	13.4
Denton	80	22	48.0	3.31	1.5
Easton	77	23	47.9	3.04	3.5
Fallston	77	20	45.9	2.79	3.0
Frederick	80	22	48.4	3.54	17.0
Frostburg				2.92	4.0
Grantsville	75	12	39.6	2.76	15.0
Great Falls	86	22	48.3	4.25	0.8
Greenspring Furnace	79	18	47.2	3.16	2.4
Harney				3.06	T.
Jewell				3.39	1.0
Johns Hopkins Hospital				3.12	.....
Keedysville	83	19	48.6	3.08	3.0
Lake Montebello	75	22	45.2	3.26	T.
Laurel	85	22	48.7	3.10	2.0
Monrovia	81	19	46.9	3.18	2.2
Mount St. Marys College	76	26	50.6	4.15	3.0
Ocean City	68[f]	25[f]	45.4[f]	2.94	
Pocomoke City	79	25	49.2	3.11	.....
Portobello	79	24	48.6	3.09	T.
Princess Anne	78	24	47.2	3.60	T.
Salisbury	81	23	48.0	3.69	2.0
Solomons	79	25	48.4	2.47	0.2
Sudlersville	82	23	47.8	3.82	0.3
Takoma Park	84	20	46.4	3.37	T.
Taneytown	78	20	46.2	3.02	0.5
Van Bibber	76[c]	22[c]	45.8[c]	4.33	.....
Westernport	83	18	46.5	2.10	0.3
Woodstock	80	22	49.4	2.63	T.
Massachusetts.					
Amherst	70	20	41.8	1.98	8.0
Bedford	75	23	42.1	2.66	7.5
Bluehill (summit)	69	23	40.1	4.16	15.4
Chestnuthill	74	21	44.0	3.67	1.5
Concord	74	22	41.4	2.84	14.4
Fallriver	68	26	42.2	3.11	3.5
Fitchburg	75	23	42.0	2.62	12.0
Framingham	75	19	41.9	3.05	7.0
Jefferson				3.04	12.2
Lawrence	75	23	41.6	2.80	9.0
Leominster				2.56	13.0
Lowell	73	23	43.6	3.64	.....
Middleboro	70	20	42.2	3.58	1.0
Monson	72	19	41.4	3.05	12.0
New Bedford	62	26	42.5	.....	.....
North Billerica	74	25	43.2	4.60	18.0
Pittsfield				2.07	10.0

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Massachusetts—Cont'd.	°	°	°	*Ins.*	*Ins.*
Plymouth	69	24	41.5	4.10	2.5
Princeton				2.07	12.0
Provincetown	60	30	43.0	2.44	3.0
Salem				3.59	5.0
Somerset	73	22	42.8	3.83	2.5
Sterling				2.16	9.0
Taunton	68	20	41.6	3.73	.....
Webster				2.83	10.0
Westboro	75	22	43.8	3.25	10.0
Weston	75	22	41.2	2.30	6.4
Williamstown	70	22	40.2	2.88	15.0
Winchendon				2.22	12.0
Worcester	72	24	42.0	2.39	11.8
Michigan.					
Adrian	77	18	39.8	2.28	
Agricultural College	71	16	37.8	2.81	0.2
Alma	66	14	37.2	3.17	4.0
Arbela	68	16	38.0	3.97	2.0
Ball Mountain	70	11	37.6	4.80	2.6
Baraga				2.45	19.5
Battlecreek	71	18	39.0	3.22	T.
Bay City	64	12	35.0	2.80	6.0
Berlin	69	14	37.1	3.24	3.0
Big Rapids	64	13	36.0	2.12	3.0
Blaney	51	1	29.4	0.90	9.0
Bloomingdale	74	20	39.2	1.86	T.
Calumet	47	5	28.0	3.35	35.0
Cassopolis	64	18	38.3	3.92	1.0
Charlevoix	54	18	33.0	1.42	13.0
Charlotte	72	4	37.2	2.00	
Chatham	53	1	27.6	2.62	24.1
Cheboygan	62	14	33.8	2.40	3.0
Clinton	72	15	38.6	2.33	T.
Coldwater	72	12	39.8	3.04	
Concord	73	17	38.2	3.33	3.5
Deer Park	46	10	30.0	0.72	6.0
Detour	54	11	30.6	2.10	16.0
Durand	74	14	38.8	3.54	0.8
Eagle Harbor	50	1	29.3	3.61	35.8
East Tawas	66	15	34.1	2.47	0.9
Eloise	72	15	38.8	2.21	2.0
Frankfort	50	16	34.7	2.35	6.0
Grand Marais	49	16	29.9	3.30	28.5
Grape	74	18	40.8	2.15	3.5
Grasslake	71	15	38.2	2.79	5.0
Grayling	60	6	32.0	1.63	13.3
Hagar				3.34	T.
Harbor Beach	62	13	37.0	2.15	0.3
Harrison	62	7	33.0	3.00	12.0
Harrisville	60	12	33.6	3.36	14.7
Hayes	69	18	37.2	1.47	6.0
Highland				2.69	4.0
Hillsdale	71	15	38.1	2.63	1.3
Holland	65	13	39.2	2.72	4.0
Howell	72	14	37.6	3.11	1.7
Humboldt	48	— 9	24.4	3.40	29.0
Iona				3.04	1.1
Iron Mountain	59	4	31.6	2.61	22.0
Iron River	55	— 1	29.2	4.70	24.0
Ironwood	54	3	30.2	2.45	24.5
Ivan	58	8	32.2	1.86	17.0
Jackson	75	18	40.0	2.71	T.
Jeddo	65	16	36.8	3.53	0.8
Kalamazoo	70	18	38.6	1.80	2.0
Lansing	71	16	38.7	3.54	4.9
Lapeer	72	15	38.4	3.49	T.
Ludington	58[d]	18[d]	35.4[d]	3.20	1.0
Mackinaw	51	12	30.7	.....	7.0
Mancelona	57	7	32.4	1.11	2.3
Maple Ridge	54	3	29.0	4.13	35.0
Marlboro	67	15	36.1	2.08	T.
Menominee	58	15	33.0	1.48	8.5
Montague	65	16	37.6	3.23	6.0
Morenci	75	18	40.8	1.84	T.
Mount Clemens	59	14	36.4	2.52	T.
Mount Pleasant				1.91	6.5
Muskegon	63	18	36.4	2.41	6.0
Old Mission	55	10	32.8	2.58	11.8
Olivet	69	17	37.0	2.68	4.3
Omer	68	12	34.8	2.66	7.0
Owosso	70	13	37.4	4.08	1.9
Petoskey	58	12	32.4	0.86	8.6
Plymouth	68	16	37.8	2.60	
Port Austin	66	15	35.0	0.70	3.0
Powers	58	11	29.2	2.00	20.0
Reed City	63	10	35.0	3.15	8.0
Roscommon	65	5	32.2	3.05	11.4
Saginaw (W. S.)	65	18	37.8	2.93	4.0
St. Ignace	51	12	30.5	.....	.....
St. James	49	14	30.8	0.91	8.0
St. Johns	69	19	38.8	.....	T.
St. Joseph	67	20	39.6	2.34	T.
Saranac	70	18	38.4	3.21	2.2
South Haven	66	10	26.3	2.81	3.0
Stanton				2.45	7.5
Thomaston	52	— 6	28.0	4.38	43.0
Thornville	71	17	39.2	4.15	5.0
Traverse City	57	16	34.4	2.93	8.0

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Michigan—Cont'd.	°	°	°	*Ins.*	*Ins.*
Vassar	64	19	35.5	1.90	T.
Wasepi	71	18	38.1	3.20	T.
Webberville	72	16	38.2	3.39	1.2
Wetmore	54	2	28.3	4.10	39.0
Whitefish Point	53	10	28.8	1.56	14.3
Woodlawn	57	6	30.2	3.13	17.5
Ypsilanti	75	16	39.9	2.94	1.0
Minnesota.					
Albert Lea	66	17	38.1	1.25	T.
Alexandria	60	12	32.6	0.47	.....
Angus	59	10	31.2	0.92	.....
Bagley	60	— 1	29.6	1.10	11.0
Beardsley	62	16	35.4	0.15	1.5
Beaulieu	62	8	31.4	0.77	5.0
Bird Island	62	14	36.5	0.80	6.1
Blackduck	64	4	30.1	1.15	.....
Caledonia	64	20	38.4	1.71	1.2
Campbell	60	10	34.0	0.41	1.0
Collegeville	59	15	35.0	0.50	3.0
Crookston	60	13	31.2	1.54	6.3
Detroit	62	4	30.8	0.98	3.0
Fairmount	64	17	37.5	1.01	
Faribault	63	12	36.8	1.02	5.3
Farmington	63	12	36.5	1.25	10.5
Fergus Falls	59	15	33.8	0.67	4.6
Fort Ripley	60	10	33.4	0.09	.....
Glencoe				1.77	5.5
Grand Meadow	62	16	36.8	2.25	1.5
Hallock	54	3	29.6	0.90	.....
Halstad	58	12	32.6	1.19	.....
Hinckley	60	15	34.2	0.52	.....
Lake Crystal	64	15	38.6	1.03	4.0
Leech Lake	52	6	27.7	2.06	7.0
Little Falls	59	11	35.0	0.27	1.0
Long Prairie	59	11	33.8	0.32	T.
Luverne	70	14	36.9	0.62	2.0
Lynd	63	10	34.8	1.94	14.0
Mankato				0.76	3.0
Maple Plain	64	16	36.6	1.21	10.7
Milaca	62	7[f]	35.0[c]	0.22	6.0
Milan	61	14	35.2	0.46	4.0
Minneapolis	62	15	36.4	1.45	11.1
Montevideo	62	12	36.0	0.96	8.5
Mora	61	13	34.8	0.23	2.0
Morris	62	14	35.1	0.20	1.6
Mount Iron	54	6	29.7	1.40	14.0
New London	62	12	33.4	0.20	3.5
New Richland	69	16	37.8	.....	.....
New Ulm	67	17	38.2	1.14	8.0
Park Rapids	58	6	31.0	1.32	9.6
Pine River	57	5	31.8	0.93	2.0
Pipestone	77	14	38.5	0.43	2.2
Pokegama Falls	57	5	30.8	1. 3	7.4
Redwing				0. 6	4.0
Redwood Falls	71	16	37.6	1.90	12.0
Reeds				1.23	
St. Charles	67	16	38.6	1.10	.....
St. Cloud	61	15	36.5	0.21	2.0
St. Peter	62	16	36.2	0.75	2.8
Sandy Lake Dam	56	12	32.7	0.93	5.1
Shakopee	63	17	38.2	1.33	10.0
Taylors Falls	71	17	40.4	0.58	4.0
Tonka				0.88	.....
Wabasha	67	19	40.2	1.23	2.0
Wadena	56	11	31.8	0.32	T.
Willow River	60	9	31.9	0.68	2.5
Windam	69	12	38.0	0.60	1.0
Winnebago	68	15	37.7	1.18	T.
Winnebegoshish	56	10	30.6	1.18	6.6
Winona	64	18	38.9	1.47	0.5
Worthington	65	12	35.5	0.57	3.0
Zumbrota	65	17	37.3	1.34	.....
Mississippi.					
Aberdeen	87	30	57.3	6.53	
Agricultural College	83	31	58.9	5.56	
Austin	86	32	56.8	9.02	
Batesville	87	30	57.2	3.96	
Bay St. Louis	84	35	65.7	11.17	
Bellefontaine	83	26	57.7	4.08	
Biloxi	85	40	66.4	13.75	
Booneville	80	29	53.9	5.86	T.
Brookhaven	89	34	61.6	6.99	
Canton	86	32	60.1	5.31	
Clarksdale	86	30	56.4	4.11	
Columbia				7.70	
Columbus	83	31	57.7	3.36	
Corinth	80	30	53.1	5.50	
Crystal Springs	87	32	61.1	4.69	
Duck Hill	86	28	57.4	5.45	
Edwards	85	33	61.6	5.64	
Enterprise				8.18	
Fayette	84	35	60.9	6.26	
Fayette (near)				4.28	
Greenville	83	33	58.2	5.29	
Greenwood	89	35	58.2	4.86	
Hattiesburg	81	32	59.8	4.82	
Hazlehurst	88	35	61.6	4.81	
Hernando	85	29	52.6	6.50	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Mississippi—Cont'd.	°	°	°	Ins.	Ins.
Holly Springs	84	30	53.4	8.13	
Indianola	84	32[c]	57.7[c]	5.67	
Jackson	86	35	60.4	4.42	
Kosciusko	86	30	57.8	4.62	
Lake	85[a]	28	60.4[b]	5.03	
Lake Como	86	30	60.2	8.12	
Laurel	87	29	61.9	8.64	
Leakesville	86	37	63.8	8.68	
Louisville	88	32	58.5	4.58	
McNeill	85	30	64.6	6.99	
Macon	82	32	57.8	4.58	
Magee	87	33[f]	60.6[d]	6.82	
Magnolia	90	31	64.5	5.48	
Monticello	89[d]	29[e]	63.0[d]		
Natchez	90	33	63.4	6.15	
Okolona	82	29	55.6	4.86	
Pearlington	85	34	65.0	10.49	
Pecan	83	37	64.4	11.34	
Pittsboro	84	29	56.3	6.77	
Pontotoc	88	30	55.0	4.66	
Porterville	83	30	59.2	7.25	
Port Gibson	87	31	61.0	4.22	
Quitman	85	29	61.2	9.26	
Ripley	82	33[d]	53.7[b]	10.47	
Shoccoe	87	30	60.2	5.55	
Shubuta				7.40	
Suffolk	86	32	62.8	4.87	
Tchula	87	35	60.2	6.41	
Tupelo				4.65	
University	82	31	55.2	7.39	
Utica	84	33	62.0	3.75	
Walnutgrove	83	30	59.6	3.72	
Watervalley	86	31	56.0	5.66	
Waynesboro	84	32	60.6	6.20	
Woodville	86	34	63.4	6.61	
Yazoo City	84	35	59.8	5.08	
Missouri.					
Albany				2.25	
Appleton City	76	23	50.2	4.38	1.0
Arlington				1.80	
Arthur	77	22	49.1	4.22	T.
Avalon	77	23	47.8	2.73	
Bagnell				2.15	
Belle	84	23	48.8	2.44	T.
Bethany	79	21	45.7	2.05	T.
Bolivar	75	20	49.8	2.85	
Boonville				3.34	
Brunswick	78	24	46.0	2.53	T.
Cape Girardeau				4.46	
Caruthersville	89	28	54.0	4.00	
Clinton	78	27	50.0	4.30	T.
Conception	74	22	42.8	1.11	T.
Darksville	82	23	48.3	3.07	T.
Dean	79	29	52.4	3.99	
Decaturville	83	21	48.5	1.13	
De Soto	80	22	48.1	3.38	T.
Doniphan	85	26	52.0	4.27	
Eldorado Springs	78	23	51.0	4.05	
Fairport				2.65	T.
Farmington	80	26	48.6	1.62	
Fulton	81	27	47.8	4.76	T.
Gads Hill	84	28	51.4	3.51	
Gano	85	23	49.0	2.75	T.
Glasgow				2.88	
Goodland	79	20	48.2	2.85	
Gorin				2.27	T.
Grant City	80	19	45.1	1.89	T.
Harrisonville	79	26	47.4	2.64	1.5
Hazlehurst				1.51	
Hermann				5.27	
Houston	81	21	49.4	3.56	
Huntsville				3.05	
Ironton	82	20	48.8	2.66	T.
Jackson	85	28	51.2	4.71	
Jefferson City	83	25	46.2	4.02	T.
Joplin	79	27	53.0	3.64	
Kidder	79	24	44.9	1.68	T.
Koshkonong	82	28	51.3	3.36	T.
Lamar	78	25	49.0	3.22	
Lamonte				3.68	1.0
Lebanon	82	24	49.3	2.56	
Lexington	77	25	47.3	2.67	
Liberty	79	25	48.4	1.95	1.5
Lockwood	75	26	50.6	2.47	T.
Louisiana	80	24	47.4	2.74	T.
Marblehill	83	26	50.8	3.70	
Marshall	78	23	47.9	3.19	T.
Maryville	75	21	42.9	2.40	4.0
Mexico	78	21	44.8	3.22	T.
Monroe	79	23	45.7	2.31	T.
Mountain Grove	76	23	48.4	3.72	
Mount Vernon	78	21	49.2	4.85	
Neosho	77	27	51.9	3.83	
New Madrid				4.88	
New Palestine	78	26	49.1	4.87	T.
Oakfield	82	26	47.7	2.90	T.
Olden	83	20	51.8	5.07	
Oregon	80	21	44.4	4.08	T.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Missouri—Cont'd.	°	°	°	Ins.	Ins.
Osceola				4.87	
Rolla				2.14	T.
St. Charles	82	23	46.4	3.61	T.
St. Joseph				1.08	T.
Sarcoxie				3.55	
Seymour	79	22	48.0	2.42	
Steffenville	79	24	46.6	2.54	
Sublett	75	20	45.8	2.03	0.3
Trenton	78	24	46.4	1.76	T.
Unionville	77	16	42.2	2.29	T.
Warrensburg	78	27	49.6	4.57	0.5
Warrenton	84	24	45.0	5.08	T.
Warsaw	80	20	49.7	5.75	1.0
Wheatland				3.87	0.5
Willowsprings	80	22	50.2	3.97	
Montana.					
Adel	65	9	39.2	1.80	18.0
Anaconda	66	4	38.7	0.75	7.0
Augusta	70	— 6	38.0	2.08	19.0
Babb	62	9	32.8	1.82	20.3
Billings	79	13	45.2	1.21	12.0
Bozeman	67	11	38.0	0.59	8.8
Bowlder	70	8	38.4	0.11	1.5
Bowen	60	10	33.2	0.61	5.8
Broadview	71	11	39.0	0.29	3.6
Butte	68	12	38.8	1.30	
Cascade	73	4	42.0	1.05	8.0
Chinook	61	8	30.8	0.03	
Choteau	73	— 5	38.6	0.59	
Columbia Falls	70	10	39.8	0.90	2.2
Copper				1.30	4.5
Crow Agency	75	10	42.6	1.60	16.0
Dayton	67	11	40.9	0.80	8.8
Decker	61	12	36.2	0.70	7.0
Dillon	72	17	44.0	1.39	10.5
Ekalaka	72	2	37.9	0.43	4.3
Ericson				0.94	4.0
Fallon	73	8	39.7	0.21	1.8
Forsyth	76	15	41.0	0.65	5.0
Fort Benton	71	12	40.1	1.60	
Fort Harrison	72	0	43.9		
Fortine	70	3	38.6	1.03	7.5
Glasgow	63	12	34.8	0.67	
Glendive	69	15	40.2	0.20	
Grayling	60	6	32.4	0.42	2.0
Greatfalls	65	13	39.6	0.90	6.7
Highwood				1.95	19.5
Huntley	74	12	43.0	0.45	2.4
Jordan	61	10	38.2	0.50	5.0
Lewistown	69	9	37.7	0.45	5.8
Livingston	71	11	40.4	1.60	10.0
Lodge Grass	76	13	41.6	0.70	5.0
Malta	61	13	36.6	0.41	4.0
Missoula	73	12	43.4	1.33	1.2
Norris	71	12	42.4	0.85	4.5
Nye				2.30	44.5
Ovando	65	0	38.3	1.05	9.0
Philipsburg	68	10	37.8	0.90	5.2
Plains	72	12	41.7	0.60	6.0
Polson	68	11	41.6	0.16	
Poplar	67	8	34.4	0.93	6.0
Raymond				1.31	12.1
Redlodge	67	1	34.9	2.06	28.0
Renovo	74	7	41.2	0.40	5.2
Saltese				1.65	14.0
Snowshoe	58	8	35.8	7.77	52.0
Springbrook	71	— 6	36.8	1.18	11.0
Steele	69	13	41.3	1.65	6.0
Tokna	71	8	37.4	0.44	2.0
Townsend				0.20	
Tosten	73	10	40.4	0.30	3.0
Troy	72	30	45.9	2.65	
Utica	68	5	37.2	0.43	4.5
Valentine	72	8	39.2	0.86	4.8
Warwick	58	9	34.0	1.71	17.2
Wolf Creek	70	1	40.2	0.93	
Nebraska					
Agate	79	9	39.6	1.10	4.0
Ainsworth	75	12	39.1	0.84	9.2
Albion	72	13	40.4	1.22	5.0
Alliance	81	15	44.6	1.10	0.2
Alma	79	13	45.8	0.74	6.5
Anoka				1.43	6.0
Arapahoe				0.80	8.0
Arcadia				1.09	2.5
Ashland	77	18	43.6	1.35	5.0
Ashton				0.86	
Atkinson	70	14	39.0	1.01	6.0
Auburn	81	17	42.0	1.95	7.5
Aurora	76	16	43.2	0.15	1.5
Beatrice	80	12	44.7	1.49	6.0
Beaver	82	17	46.4	0.90	7.0
Bellevue	76	22	43.3	1.60	5.7
Blair	75	16	42.6	1.99	12.8
Bloomfield	73	10	39.8	0.90	4.0
Blue Hill				0.70	4.0
Blue Springs				1.43	8.2
Bradshaw				1.05	5.0

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Nebraska—Cont'd.	°	°	°	Ins.	Ins.
Bridgeport	82	13	44.8	1.05	4.5
Brokenbow	75	9	41.0	0.28	1.0
Burchard				1.80	4.5
Burwell				0.40	2.0
Callaway	75	11	43.5	0.40	3.0
Chester				0.35	2.5
Columbus	75	17	41.3	0.88	2.5
Crete	78	18	43.8	1.34	5.2
Culbertson	75	16	46.6	0.91	6.0
David City	73	20	41.8	0.94	4.0
Dawson	82	20	45.2	1.64	
Dubois				1.70	2.5
Duff				0.95	
Dunning				0.30	3.0
Edgar				1.00	2.0
Ellis				1.22	7.5
Ericson				0.25	2.5
Ewing	71	13	39.8		5.0
Fairbury	82	17	45.5	1.54	14.0
Fairmont	88	14	42.6	0.87	4.2
Fort Robinson	78	3	40.0	1.25	12.5
Franklin	81	16	45.4	0.23	2.3
Fremont	57	17	42.4	1.40	9.5
Fullerton	71	16	42.4	0.68	1.5
Geneva	79	15	44.1	0.80	4.8
Genoa (near)	70	17	41.6	0.84	5.0
Gering				0.63	3.8
Gosper				0.81	
Gothenburg	77	14	45.3	1.53	10.0
Grand Island	73	19	44.6	0.69	5.0
Grant	82	11	43.2	0.75	5.5
Greeley				0.20	2.0
Guide Rock				1.06	4.1
Halsey	76	10	42.6	0.13	
Hartington	74	17	39.4	0.54	
Harvard	74	15	42.1	0.77	1.6
Hastings*[1]	72	25	42.0	1.80	6.0
Hayes Center	83	19	43.8	1.40	12.0
Hay Springs	78	11	40.2	0.20	2.0
Hebron	80	15	44.1	1.40	7.8
Hendley				0.75	5.0
Hickman				1.45	4.0
Holdrege	77	19	46.4	0.73	5.0
Hooper*[1]	70	24	41.4	0.97	7.0
Imperial	82	13	43.2	1.64	14.5
Kennedy	78	11	42.0	0.92	6.0
Kimball	82	14	43.0	0.45	3.5
Kirkwood	74	12	39.8	0.90	
Leavitt	77	15	42.4	0.81	3.5
Lexington	84	8	42.9	0.80	6.2
Lodgepole	83	12	42.8	0.22	2.2
Loup	72	13	42.2	0.85	4.0
Lynch	75	13	43.2	1.52	9.0
McCook				1.40	6.5
McCool				0.99	5.5
Madison	71	15	40.8	0.87	4.0
Marquette				0.94	4.0
Minden	77	15	43.2	1.75	6.6
Monroe				0.89	3.0
Nebraska City	78	17	43.2	1.85	11.0
Nemaha				1.80	4.0
Norfolk	75	13	41.4	0.92	7.0
North Loup	75	13	42.4	1.28	3.8
Oakdale	71	15	40.0	1.01	4.2
Oakland	73	14	41.6	0.80	
Odell				0.82	2.2
Ord				1.16	
Osceola	76	16	43.2	0.20	2.0
Palmer				0.75	1.5
Palmyra*[1]	78	20	43.6	1.65	7.0
Pawnee City	82	16	44.7	1.30	5.0
Plattsmouth				2.57	4.2
Plymouth	79	16	44.6	1.23	7.5
Purdum	77	12	40.8	0.30	8.0
Ravenna	72	14	42.2	1.35	7.0
Redcloud	82	11	44.0	1.32	4.0
Republican				0.85	6.0
Rulo				1.45	7.0
St. Libory				1.25	5.0
St. Paul	72	18	42.9	1.15	5.5
Santee	74	18	43.0	1.82	6.7
Schuyler				1.11	5.0
Scottsbluff	83	17	45.2	0.47	
Seward	80	15	43.2	0.95	3.0
Springview	73	13	40.0	1.36	10.0
Stanton	76	12	41.4	1.95	14.0
Strang				0.72	1.2
Stratton				1.63	5.0
Superior				1.40	4.0
Syracuse				2.03	17.0
Tablerock				1.80	9.0
Tecumseh	81[d]	16[d]	46.2[d]	1.34	4.5
Tekamah	74	17	42.2	0.98	7.0
Turlington	78	20	42.8	1.66	18.0
University Farm	79	17	44.0	0.77	3.4
Wahoo				0.64	3.0
Wakefield	72	17	40.0	0.74	3.7
Watertown				0.56	2.6

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Nebraska—Cont'd.	°	°	°	*Ins.*	*Ins.*
Wauneta				1.64	12.0
Weeping Water				3.01	4.5
Westpoint	74	15	42.1	0.80	8.0
Wilber				2.04	12.0
Winnebago	75	12	41.2		
Wisner				2.10	12.0
Wymore				0.25	4.5
York	76	16	43.0	0.97	4.0
Nevada.					
Amos	76	21	49.9	0.42	
Aura	67	20	41.7	1.36	T.
Battle Mountain	64	26	45.0		
Carson Dam	80	32	54.3	0.99	
Clover Valley	77	18	47.6	1.73	
Columbia	80	28	52.2	T.	
Dyer	82	12	45.6	T.	T.
Elko *[1]	75	35	47.6	0.28	
Eureka	78	17	46.7	1.04	3.0
Fallon	81	29	54.8	1.06	
Fernley	81	28	54.2	1.00	
Gardnerville	83	20	48.4	0.10	
Geyser	78[d]	14[d]	44.3[d]	0.84	T.
Golconda	77	25	51.8	0.07	
Halleck	77	18		0.70	T.
Hamilton	66	14	38.4	0.36	T.
Hazen	84	32	56.3	0.65	
Leetville	81	30	55.3	0.11	
Lewers Ranch	78	25	50.3	1.40	
Logan	94	36	65.8	0.42	
McGill	77	19	47.0	0.28	
Mill City *[1]	80	40	54.4	0.00	
Mina	87	28	55.0	T.	
Palmetto	82	18	46.8	1.21	4.0
Paradise Valley				0.95	
Pioche	84	24	52.2	0.83	
Potts	75	14	44.2	0.37	4.0
San Jacinto	78[d]	15[d]	44.8[d]	0.84	T.
Tecoma	78	20	47.3	T.	
Wabuska	82	23	52.4	0.35	
Wells				T.	
New Hampshire.					
Alstead	70	16	38.0	2.77	19.0
Bethlehem	66	11	35.6	4.10	19.0
Brookline	76	20	43.7	1.70	16.0
Durham	76	21	42.4	2.94	12.5
Franklin Falls	79	15	40.2	2.30	18.0
Grafton	74	9	38.0	2.98	18.0
Groveton	75	9		3.41	8.5
Hanover	73	13	38.9	4.04	18.2
Keene	75	15	40.4	2.51	12.5
Nashua	77	17	42.0	2.47	14.0
Newton	75	15	40.2	2.95	10.0
N. Woodstock				2.02	
Plymouth	74	17	39.8	3.60	14.7
New Jersey.					
Asbury Park	69	25	43.2	4.55	7.5
Bayonne	76	25	44.9	3.97	5.5
Belvidere	77	22	45.3	2.90	2.5
Bergen Point	74	23	44.5	4.77	7.0
Beverly	83	24	47.0	4.13	2.0
Bridgeton	80	23	47.7	3.09	4.0
Canton				3.90	2.0
Cape May C. H.	73	24	45.6	4.06	2.0
Charlottsburg	73	19	42.3	3.47	
Clayton	80	24	46.2	4.15	3.0
College Farm	79	21	45.0	2.22	
Dover	72	20	41.1	3.82	3.6
Elizabeth	80	25	47.0	4.71	
Englewood	74	26	44.4	4.40	6.5
Flemington	78	23	45.8	2.74	3.9
Friesburg	80	23	46.3	4.08	3.3
Hightstown	79	23	45.2	3.60	8.0
Imlaystown	79	23	45.4	3.66	7.1
Indian Mills	83	24	46.8	4.61	9.0
Jersey City	77	25	46.2	4.64	7.6
Lakewood	77	23	45.6	4.26	4.0
Lambertville	79	23	46.6	3.24	4.5
Layton	74	19	42.0	2.06	5.5
Moorestown	79	23	46.0	3.68	8.2
Newark	76	23	45.4	5.89	5.8
New Brunswick	79	21	44.3	3.55	7.0
Newton	76	19	43.5	2.55	3.5
Oceanic	78	27	45.2	4.96	8.0
Paterson	78	25	46.8	3.78	2.8
Phillipsburg	78	22	45.2	2.75	4.2
Plainfield	79	23	44.9	3.10	4.9
Pleasantville				3.42	1.0
Rancocas				3.71	4.2
Rivervale	75	20	42.8	4.20	6.0
Somerville	80	23	45.8	3.22	4.0
South Orange	77	23	44.6	3.80	4.5
Sussex	74	21	43.4	2.67	4.0
Toms River	78[e]	23[d]	44.6[d]	5.14	6.0
Trenton	80	25	47.4	3.01	T.
Tuckerton	71	23	44.2	4.52	7.0
Vineland	78	24	46.4	4.22	3.0
Woodbine	76	22	45.6	3.67	4.2

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
New Mexico.	°	°	°	*Ins.*	*Ins.*
Alamagordo	92	25	61.4	0.35	
Albert	86	20	53.6	2.12	16.0
Albuquerque	89	20	56.8	2.50	
Alto				1.31	7.2
Bellranch	86	19	53.0	2.66	12.5
Bloomfield	84	24	52.2	1.27	2.0
Cambray				0.00	
Carlsbad	97	29	62.1	0.05	
Chama	73	19	43.4	2.90	23.0
Cimarron	82	17	47.8	1.73	24.0
Cliff	95	22	57.8	0.81	
Cloudcroft	70	8	43.0	0.83	6.0
Datil	83	9	47.5	1.30	7.0
Deming	85	30	54.2	0.19	
Dorsey	79	17	48.0	1.07	7.0
Dulce	79	12	48.1	2.10	2.5
Eagle Rock Ranch	79	12	46.2	4.88	57.0
Elizabethtown	68	12	41.1	3.40	34.0
Elk	87	23	54.4	0.24	3.0
Espanola	83[f]	24[f]	51.2[f]	2.53	6.0
Estancia	80	6	48.4	1.97	12.0
Fort Bayard	83	20	55.0	0.80	
Fort Stanton	84	20	51.8	0.15	1.5
Fort Union	78	14	44.3	1.26	
Fort Wingate	78	19	49.5	1.19	7.8
Frisco	87	20	53.6	1.94	
Gage	89	22	58.4	0.13	
Glen	86	26	57.0	0.97	4.0
Hillsboro	90	25	57.0	0.18	2.0
Hope				0.50	
Laguna	86	19	52.6	3.00	21.0
Lagunita	89	20	54.7	1.70	12.5
Lake Valley				0.23	0.5
Las Vegas	82	6	48.6	2.18	17.5
Lordsburg				0.27	
Los Alamos				2.06	9.0
Los Lunas	85	25	55.1	1.04	1.0
Luna	89	10	48.0	0.65	T.
Magdalena	87	14	52.0	2.92	16.0
Manuelito				1.22	5.0
Mesilla Park	94	22	64.1	T.	
Mimbres				0.75	
Mineral Hill				2.61	28.0
Monument	95	32	61.8	0.00	
Mountain Air	86	14	51.1	2.68	18.0
Nara Visa	85[e]	24[e]	54.0[e]	3.56	24.0
Orange	95	23	59.4	0.02	
Red River				4.15	41.0
Redrock				0.28	
Rincon	94	24	60.4	0.06	T.
Rociada	73	11	44.4	2.56	39.0
Rosa				1.69	
Rosedale	82	20	52.2	1.59	6.9
San Marcial	90	24	59.4	1.31	6.0
San Rafael	84	17	51.4	1.98	10.0
Socorro	94	15	55.8	1.95	
Springer	82	12	48.1	1.25	12.5
Strauss				T.	T.
Taos	80[e]	22[e]	49.6[e]	1.04	
Tres Piedras	72	6	42.4	1.82	17.0
Tucumcari	87	24	55.5	2.31	18.0
Valley				1.92	18.2
Vermejo	78[h]	14	44.4[d]	2.39	16.0
Winsors	73	15	60.8	3.16	
New York.					
Adams	78	18	43.1	2.75	10.5
Addison	72	16	41.1	3.32	2.0
Allegany	80	13	39.8	3.44	7.1
Amsterdam	72	19	39.7	3.87	12.0
Angelica	78	12	38.0	3.47	10.0
Appleton	79	22	38.8	1.46	T.
Athens	73	21	42.8	2.02	5.5
Atlanta	80	14	36.6	2.79	
Auburn	72	18	40.0	3.59	5.0
Avon	78	18	43.8	3.23	4.5
Baldwinsville	71	18	39.0	3.48	11.0
Balston Lake	70	17	40.5	2.14	6.9
Bedford	75	23	44.0	2.68	9.5
Blue Mountain Lake				2.97	21.0
Bolivar	77	13	38.8	3.46	4.5
Bouckville	67	12	36.6	4.08	15.0
Brockport	78	18	40.2	2.21	5.0
Cape Vincent	68	19	38.4	3.50	11.5
Carmel	68	22	41.7	4.07	15.5
Carvers Falls	74	14	39.3	4.26	8.0
Chatham	75	18	42.2	1.98	5.0
Chazy	70	13	39.1	1.45	8.2
Coeymans	71	18	42.2	1.40	6.0
Cooperstown	72	18	38.0	4.67	9.0
Cortland	69	15	37.6	2.49	
Cutchogue	65	26	43.2	2.98	10.0
Dannemora	71	9	35.3	2.41	16.4
De Ruyter	68	16	36.9	4.51	13.1
Easton				3.95	14.0
Elba	74	16	37.6	2.58	8.2
Faust[c]	66	10	32.1	1.00	8.0
Fayetteville	75	18	40.7	3.11	6.0
Fort Plain	73	22	42.0	4.24	10.0

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
New York—Cont'd.	°	°	°	*Ins.*	*Ins.*
Franklinville	77	12	37.4	2.76	3.9
Gabriels	68	8	34.4	1.81	11.5
Gansevoort				2.80	11.0
Glens Falls	73	20	40.8	3.04	8.2
Gloversville	72	18	39.5	3.98	12.5
Greenfield	71	22	41.0	4.10	6.0
Greenwich	72	16	40.6	3.21	10.5
Griffin Corners	70	12	36.1	1.72	16.0
Harkness	71	13	38.0	1.29	10.0
Haskinville				3.62	10.7
Hemlock	75	16	35.8	2.72	6.0
Hunt	80	18	40.4	2.00	1.0
Indian Lake	69	7	36.2	3.95	10.0
Ithaca	77	18	38.8	3.70	5.8
Jamestown	77	12	40.0	2.70	8.0
Jeffersonville	72	18	39.5	1.55	2.0
Keene Valley	68	10	37.4	2.56	11.0
Kings Ferry				2.28	5.0
Lake George	66	16	40.4	5.28	13.2
Le Roy	79	18	39.6	2.90	9.1
Liberty	68	8	35.1	2.97	
Littlefalls, City Res.	70	20	39.0	3.35	7.0
Lockport	76	17	39.7	1.58	T.
Lowville	71	16	37.4	2.81	4.0
Lyndonville				1.39	
Lyons	75[d]	22[d]	42.0[d]	2.74	T.
Middletown	71	21	42.6	2.42	7.5
Mohonk Lake	68[e]	18[e]	39.4[e]	2.12	6.0
Moira	73	8	37.4	3.44	12.0
Mount Hope	77	25	44.0	2.36	9.0
Newark Valley				3.41	4.5
New Lisbon	70	15	36.0	3.62	9.0
North Hammond	73[d]	14[d]	38.1[d]	2.54	2.0
North Lake	66	10	34.8	3.51	
Norwich	69	18	40.2	3.59	1.9
Ogdensburg	70	17	38.6	2.18	6.2
Oneonta	71	22	41.0	2.95	5.0
Oxford	70	16	39.3	3.88	14.5
Oyster Bay	68	25	44.5	3.30	18.0
Perry City	71	13	37.4	4.64	8.7
Plattsburg	67	12	39.4	2.24	5.0
Port Jervis	74	20	44.5	2.37	3.0
Richland	74	15	37.0	2.11	4.0
Romulus	73	18	40.8	2.64	5.4
Rose	74	20	39.0	3.12	2.0
Salisbury Mills	72	15	38.8	2.79	
Scarsdale	74	22	43.2	2.55	8.0
Setauket	70	26	43.6	3.18	10.5
Shortsville	76	17	39.2	2.63	T.
Skaneateles				4.44	
Southampton	61	26	42.6	2.48	6.2
South Canisteo	73	14	37.6	4.11	11.0
Spier Falls	71	17	39.9	3.95	11.0
Taberg	73	11	38.8	3.70	5.8
Ticonderoga	68	14	39.6	2.75	8.0
Trudeau	71	8	36.2	2.24	10.5
Volusia	76	12	37.0	2.09	4.0
Wading River	71	21	42.6	2.49	5.5
Wappinger Falls	74	22	43.2	3.14	10.0
Warwick				2.91	10.0
Watertown	73	11	39.2	3.30	7.0
Waverly	73	19	41.7	2.87	4.5
Wedgwood	70	15	37.7	4.10	9.5
West Berne	73	9	39.7	3.87	13.0
Westfield	78	15	38.9	2.12	10.0
Westpoint	74	20	42.6	3.14	4.1
Windham	71	15	38.8	1.97	10.0
Youngstown				1.43	0.5
North Carolina.					
Beaufort	76	32	54.4	7.24	
Brevard	77	20	50.0	4.67	T.
Brewers	83	22	49.4	4.82	T.
Buck Springs[f]	74	9	39.8		
Caroleen	83	20	54.0	2.93	
Chalybeate Springs	85	24	52.6	3.03	T.
Chapelhill	84	26	51.5	6.05	
Clinton	82	28	53.8	3.47	
Eagletown	83	29	51.8	4.20	T.
Edenton	80	28	52.0	5.20	
Fayetteville	85	28	54.3	4.80	
Graham				5.43	T.
Goldsboro	87	28	53.2	3.98	T.
Greensboro	83	27	51.5	3.73	
Greenville				3.90	
Henderson	76	26	47.3	4.05	T.
Hendersonville	78	25	49.6	2.91	
Horse Cove	71	23	48.2	5.10	0.1
Hot Springs	86	21	52.1	4.05	4.0
Kinston	83	28	54.6	4.05	
Lenoir	87	19	52.4	3.85	T.
Lexington	80	24	51.3	5.72	
Lincolnton	80	22	54.8		
Louisburg	84	28	51.6	4.75	T.
Marion	85	23	52.2	3.64	T.
Moncure	85	23	52.4	4.39	
Monroe	82	17	52.8	4.18	
Morganton	82	22	50.8	4.67	
Mountairy	82	25	49.2	3.39	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	*Ins.*	*Ins.*
North Carolina—Cont'd.					
Mount Holly	.....	.....	.....	4.32	
Nashville	85	27	51.3	4.24	.....
New Berne	85	27	54.0	4.05	T.
Patterson[a b]	78	22	48.3	3.66	T.
Pinehurst	85	28	56.0	2.49	
Ramseur	87	22	51.9	4.14	T.
Randleman	.....	.....	.....	4.19	
Reidsville	84	26	51.9	5.00	2.0
Salem	82	26	50.7	.....	
Salisbury	83	20	52.0	5.82	.....
Sapphire	73	12	47.0	3.99	T.
Saxon	80	22	47.3	3.36	T.
Scotland Neck	83	28	52.7	5.75	T.
Selma	85	26	52.0	2.65	T.
Settle	83	19	51.0	4.28	
Sloan	81	27	53.8	4.44	
Snowhill	85	30	53.4	4.35	
Southern Pines	87	27	55.0	2.75	
Southport	79	29	55.6	4.79	T.
Statesville	85	19	52.4	3.85	T.
Tarboro	86	29	52.3	4.60	T.
Vade Mecum	81	21	49.5	4.91	
Washington	84	29	54.9	4.96	
Wash Woods	70[c]	32[c]	49.9[d]	3.91	
Waynesville	78	17	48.6	2.94	T.
Weldon	86	28	51.4	4.96	
Whiteville	84	24	54.6	3.92	
North Dakota.					
Amenia	70	12	33.2	0.80	8.0
Aplin	66	8	34.2	0.60	3.0
Beach	75	0	35.7	0.35	.....
Berlin	74	9	31.4	1.01	10.0
Bottineau	55	11	29.4	0.29	T.
Buford	66	9	34.8	0.61	1.5
Cando	60	5	29.4	0.54	8.0
Chilcot	57	8	30.6	0.35	3.5
Coalharbor	61	9	33.7	0.30	3.0
Cooperstown	64	9	31.0	0.08	.....
Crosby	48[f]	8[f]	28.6[f]	0.37	.....
Dickinson	69	5	34.3	0.30	2.1
Donnybrook	54	8	30.2	0.36	2.5
Dunseith	49	10	28.0	0.70	7.0
Edgeley	74	12	33.8	0.35	
Edmore	60[c]	−2[c]	29.2[c]	0.80	8.0
Forman	72[d]	15[d]	37.8[d]	0.30	3.0
Fort Berthold	68	9	34.9	0.30	0.6
Fort Yates	75	11	38.2	0.12	0.2
Fullerton	72	12	33.8	0.41	2.1
Gladys	52	5	29.0	0.55	5.0
Goforth	73	5	35.6	1.15	6.0
Granville	61	12	32.0	0.24	2.0
Hamilton	51	0	26.5	1.70	17.0
Hillsboro	63	12	32.8	1.29	3.3
Hurd	74	7	36.7	0.25	2.0
Jamestown	80	14	36.6	0.59	.....
Kulm	64	12	31.8	0.67	3.9
Lakota	57	2	28.2	2.08	12.4
Langdon	50	−6	26.4	0.77	.....
Larimore	62	6	28.4	0.54	.....
Lisbon	69	12	33.0	0.37	2.0
McKinney	54	−2	28.2	0.80	8.0
Manfred	52	12	32.1	0.77	3.1
Mayville	70	9	31.7	0.80	8.3
Medora	76	6	37.8	0.11	1.5
Melville	58	10	29.3	0.15	1.5
Minot	62	10	31.4	0.60	1.1
Minto	58	8	30.0	1.25	8.0
Napoleon	63	7	32.0	0.25	1.6
New Salem	69	9	34.2	0.31	1.0
Oakdale	67	8	33.5	0.50	5.0
Oriska	68	11	32.8	0.88	7.0
Palermo	52	3	29.8	0.60	6.0
Park River	56	2	28.6	0.77	7.7
Pembina	55	0	27.1	1.61	15.0
Portal	48	1	27.0	0.80	4.0
Power	62	10	33.2	0.25	1.5
Pratt	55	9	29.9	0.64	2.5
Steele	69	11	35.4	0.21	1.0
University	64	10	32.4	0.11	1.1
Valley City	68	12	33.4	0.91	5.2
Walhalla	54	4	26.8	0.30	4.0
Washburn	66[c]	10[c]	33.2[c]	0.10	.....
Willow City	62	13	32.2	0.10	1.0
Wishek	73	9	35.5	T.	T.
Ohio.					
Akron	78	16	41.0	2.40	2.6
Amesville	83	19	46.4	2.91	1.4
Bangorville	77	14	41.0	3.48	2.0
Bellefontaine	75	16	39.9	2.97	5.9
Benton Ridge	79	20	42.2	1.36	1.7
Bladensburg	78	13	42.4	2.57	0.3
Bowling Green	79	19	41.0	1.74	1.5
Bucyrus	83	15	39.8	2.55	1.5
Cadiz	81	15	43.2	3.12	4.4
Cambridge	80	16	44.2	4.00	T.
Camp Dennison	81	20	45.6	3.78	0.3
Canal Dover	78	12	41.8	3.83	0.5
Canton	77	17	41.2	3.09	3.0
Ohio—Cont'd.					
Circleville	80	20	44.2	3.57	1.0
Clarington	81	18	45.8	3.36	0.6
Clarksville	77	21	43.8	3.59	1.6
Cleveland[b]	78	20	40.4	1.75	1.5
Columbus	77	20	43.1	3.14	T.
Dayton	77	21	42.8	2.94	3.7
Defiance	80	20	40.4	1.99	3.0
Delaware	77	16	42.0	3.39	3.3
Demos	79	16	44.7	2.50	1.4
Findlay	80	18	40.8	1.23	0.5
Frankfort	83	20	45.2	3.35	0.5
Fremont	80	19	42.8	1.78	0.6
Garrettsville	78	12	40.3	2.28	2.4
Granville	78	17	42.0	2.77	1.0
Gratiot	78	16	43.2	3.00	2.7
Green	84	20	45.7	3.30	0.5
Greenhill	77	11	40.0	3.58	2.0
Greenville	78	20	41.4	2.54	.....
Hedges	80	18	41.8	2.46	0.2
Hillhouse	80	10	39.5	2.28	4.0
Hiram	77	14	40.4	2.99	2.0
Hudson	84	10	40.2	2.51	2.0
Ironton	85	21	48.2	2.03	T.
Jacksonburg	77	22	42.2	3.22	6.0
Jeffersonville	77	20	43.6	3.07	0.1
Kenton	76	19	39.7	1.59	T.
Killbuck	79	15	42.1	2.84	2.0
Lancaster	79	19	43.6	3.55	2.2
Lima	78	21	41.9	1.35	T.
McConnelsville	81	18	44.1	3.34	1.5
Marietta	82	23	48.8	2.69	.....
Marion	80	15	42.0	3.54	2.9
Medina	79	12	41.0	3.04	8.0
Milfordton	76	14	40.4	3.13	2.0
Milligan	80	18	43.6	4.36	3.0
Millport	78	13	41.0	3.29	0.7
Montpelier	73	19	40.5	2.15	2.4
Napoleon	77	21	43.0	1.83	0.5
Nellie	72	22	43.5	3.47	1.0
New Alexandria	81	15	44.1	4.05	3.0
New Berlin	74	14	40.8	3.03	T.
New Bremen	79	21	42.5	1.40	0.5
New Richmond	77	21	45.0	2.85	1.5
New Waterford	80	14	39.4	4.08	0.2
North Royalton	78	14	40.5	3.01	8.0
Norwalk	80	17	39.5	1.31	2.2
Ohio State University	76	19	42.4	3.07	0.2
Ottawa	80	20	42.1	1.48	T.
Pataskala	78	16	42.3	3.53	5.9
Philo	80	18	42.4	4.37	2.3
Plattsburg	76	19	42.2	2.94	5.0
Pomeroy	86	22	44.6	3.24	3.5
Portsmouth	84	24	48.0	2.44	T.
Pulse	72	21	44.0	3.03	0.8
Rittman	80	15	40.8	1.43	T.
Rockyridge	81	19	41.6	1.37	0.8
Rome	83	12	41.2	1.91	T.
Shenandoah	77	13	39.6	3.02	4.0
Sidney	79	21	42.8	2.43	2.2
Somerset	79	18	43.1	3.96	4.5
South Lorain	81	14	41.2	1.97	1.2
Springfield	.....	.....	.....	2.56	1.3
Summerfield	79	18	44.4	3.07	2.0
Thurman	84	21	47.1	1.99	T.
Tiffin	77	20	41.1	1.48	1.8
Toledo (St. Johns College)	78	20	41.5	1.65	1.8
Upper Sandusky	77	18	42.2	2.63	0.8
Urbana	78	18	42.4	2.95	2.5
Vickery	80	18	40.5	1.79	0.9
Warren	80	15	41.2	2.31	3.1
Wauseon	78	18	39.5	1.80	1.9
Waverly	84	20	45.6	2.78	4.4
Waynesville	76	21	43.4	2.86	3.2
Wellington	80	16	42.2	2.81	3.0
Willoughby	.....	.....	.....	1.58	T.
Wilson	81	17	45.7	2.84	T.
Wooster	78	15	41.7	2.69	2.8
Zanesville	.....	.....	.....	3.42	1.8
Oklahoma.					
Arapaho	89	30	56.0	4.35	0.5
Beaver	86	23	53.8	0.81	3.0
Brule	88	22	53.0	1.29	T.
Cache	87	34	56.6	2.60	
Chandler	90	33	55.6	4.23	
Chattanooga	89	32	59.1	0.75	
Cloud Chief	89	29	56.6	3.73	
Dacoma	87	29	52.6	4.06	T.
Enid	86	29	53.0	3.32	
Erick	90	29	54.3	2.44	1.0
Fort Reno	87	.....	.....	3.40	T.
Fort Sill	88	33	58.8	1.27	
Gage	86	26	52.6	4.17	T.
Grand	85	26	52.7	5.10	T.
Guthrie	86	35	56.0	4.60	
Harrington	88	25	53.2	2.35	0.6
Hennessey	83	30	56.5	4.09	T.
Hobart	90	32	57.8	2.96	T.
Holdenville	86	33	54.1	3.56	
Oklahoma—Cont'd.					
Hooker	95	20	55.2	1.80	7.5
Jefferson	87	29	53.1	4.05	
Kenton	86	21	52.4	2.94	11.4
Kingfisher	87	30	56.2	4.68	
Mangum	90	35	57.6	2.90	
Meeker	85	32	55.0	5.30	
Neola	87	32	56.5	3.01	T.
Newkirk	86	30	55.0	5.44	
Norman	91	33	56.4	3.38	
Okeene	89	31	55.0	4.46	T.
Pawhuska	88	31	55.0	5.12	
Perry	89	29	54.6	5.30	
Sac and Fox Agency	86	36	56.8	4.90	
Shawnee	86	35	55.6	4.25	
Snyder	89	33	58.6	1.93	
Stillwater	88	33	53.2	6.71	
Temple	97	34	62.6	1.05	
Waukomis	90	30	54.6	4.97	
Weatherford	85	31	53.0	4.05	2.0
Whiteagle	89	28	54.6	3.02	
Oregon.					
Alba	.....	.....	.....	1.43	
Albany	82	34	52.6	2.70	
Ashland	77	31	52.7	1.11	
Astoria	68	39	51.1	4.37	
Aurora (near)	71	35	50.8	4.09	
Bay City	75	32	48.6	7.27	
Bend	78	11	44.0	1.30	4.0
Blalock	78	35	84.0	0.96	
Buckeye Mine	55	12	32.4	1.90	19.0
Buckhorn	82	30	52.4	6.83	
Bullrun	76	32	50.5	7.83	
Burns	78	24	50.5	1.06	4.0
Carlton	75	30	49.3	2.70	
Coquille	.....	.....	.....	5.09	
Corvallis	80	32	51.9	2.98	
Dayville	85	22	50.8	0.47	
Doraville	75	29	47.2	3.69	
Drain	86	29	52.2	4.58	
Echo	.....	.....	.....	0.67	
Ella	76	26	50.4	0.73	
Eugene	77	34	51.2	4.03	
Fairview	83	31	52.2	6.82	
Falls City	70	30	49.0	6.25	
Forestgrove	70	28	48.9	3.20	
Gardiner	85	36	52.4	7.04	
Glendale	83	28	51.2	3.91	
Glenora	82	28	47.6	12.19	2.0
Gold Beach	77	31	49.4	6.83	
Government Camp	64	18	38.6	7.35	47.0
Granite	71	15	46.0	0.75	
Grants Pass	88	29	54.0	2.44	
Grass Valley	64	18	42.2	1.06	
Heisler	80	18	47.8	0.50	
Heppner	73	26	47.5	1.41	
Hermiston	.....	.....	.....	0.46	
Hood River	85	27	50.2	4.86	
Huntington	74	28	52.4	0.55	
Jacksonville	83	29	53.2	2.07	
Joseph	64	18	41.8	1.77	14.0
Klamath	70	25	48.4	0.55	2.0
Lagrande	72	25	45.6	2.56	T.
Lakeview	75	24	46.4	0.22	
Lost River	72	24	46.8	0.66	
McKenzie Bridge	82	22	47.8	8.26	4.5
McMinnville	78	31	51.9	3.58	
Marshfield	81	33	51.0	7.66	
Mill City	81	30	50.6	6.75	
Mitchell	74	23	47.0	0.68	
Monroe	77	32	51.2	3.33	
Mountain Park	77	28	45.6	7.27	3.0
Mount Angel	76	34	54.2	5.56	
Nehalem	.....	.....	.....	7.92	
Newport	74	35	52.0	5.24	
Odell	.....	.....	.....	1.50	3.7
Olex (near)	76	27	48.2	0.55	T.
Ontario	.....	.....	.....	0.50	
Orseco	66[c]	23[c]	41.4[c]	10.50	67.5
Paisley	71	23	48.4	0.09	
Pendleton	76	24	49.5	0.91	
Port Orford	72	38	50.4	6.70	
Prineville	76	17	44.8	0.96	
Richland	.....	.....	.....	0.40	
Riverside	80	15	47.5	0.60	1.5
Salem	75	34	52.2	1.69	
Silver Lake	74	10	46.5	0.52	
Stafford	78	32	51.6	4.50	
The Dalles	79	30	52.1	1.67	
Toledo	77	32	51.0	5.71	
Umatilla	81	29	54.2	0.50	
Van	.....	.....	.....	1.04	
Wallowa	73	16	43.6	1.22	0.2
Wamic	.....	.....	.....	0.00	
Warm Spring	82	22	49.4	0.70	
Weston	74	25	47.2	1.80	T.
Williams	85[h]	26[h]	51.4[h]	2.44	
Pennsylvania.					
Aleppo	81	16	44.6	3.34	5.0

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	*Ins.*	*Ins.*
Pennsylvania—Cont'd.					
Altoona	78	13	41.4	1.89	......
Baldwin	79	11	41.3	3.75	4.8
Beaver Dam	......	......	......	3.12	1.0
Bellefonte	80	18	47.0	2.71	4.0
Browers Lock	......	......	......	2.73	
California	83	21	46.0	2.13	1.0
Cassandra	75	11	40.2	2.02	11.0
Clarion	......	......	......	3.28	2.2
Claysville	84	14	44.8	3.49	7.4
Clearfield	......	......	......	1.88	4.4
Coatsville	77	21	45.8	2.93	3.2
Confluence	......	......	......	3.82	3.1
Caraopolis	......	......	......	1.89	1.1
Davis Island Dam	......	......	......	2.11	4.6
Derry	81	13	45.2	2.63	11.0
Doylestown	......	......	......	4.22	
Drifton	73	15	42.5	1.26	9.5
East Mauch Chunk	77	19	44.0	2.09	3.8
Easton	75	21	45.4	3.42	1.8
Ellwood Junction	......	......	......	4.30	2.0
Emporium	78	15	42.2	3.40	3.5
Ephrata	77	19	44.9	2.16	2.0
Everett	80	16	43.4	3.05	2.5
Forks of Neshaminy	......	......	......	3.88	
Franklin	80	8	40.7	3.90	2.0
Freeport	78[e]	15[e]	42.4[e]	2.74	1.5
George School	77	23	45.5	3.61	4.8
Gettysburg	79	18	46.8	2.21	3.0
Girardville	......	......	......	2.46	8.2
Gordon	76	19	43.0	2.85	6.4
Greensboro	......	......	......	1.56	0.5
Greenville	80	12	40.8	2.80	4.2
Grove City	78	13	41.0	4.17	3.1
Hamburg	77	21	46.0	1.26	2.0
Hanover	79	19	49.2	2.45	T.
Herrs Island Dam	......	......	......	2.06	1.5
Huntingdon	79	18	44.8	2.18	4.0
Hyndman	81	11	45.6	2.03	1.0
Indiana	81	13	42.7	2.69	5.5
Irwin	83	14	45.1	2.56	6.8
Johnstown	80	16	43.6	3.59	2.6
Kennett	77	22	46.2	1.85	......
Lansdale	......	......	......	2.92	
Lawrenceville	73	16	40.4	2.94	5.5
Lebanon	76	21	46.6	2.20	4.4
Leroy	72	15	39.9	2.67	5.8
Lewisburg	80	22	45.6	1.82	1.7
Lockhaven	77	18	46.2	1.98	3.0
Lock No. 4	......	......	......	2.53	T.
Lycippus	79	13	42.7	2.96	12.0
Marion	78	17	45.2	3.17	4.0
Mauch Chunk	......	......	......	2.09	3.8
Mifflintown	78	20	44.9	2.74	3.0
Milford	75	20	41.6	2.36	5.6
Montrose	77	15	39.3	2.71	9.0
New Germantown	78	18	45.7	3.43	2.0
Ottsville	......	......	......	3.25	
Parker	......	......	......	3.38	4.2
Philadelphia	79	26	47.8	3.01	2.0
Pocono Lake	69	14	37.4	1.20	6.0
Point Pleasant	......	......	......	2.89	
Pottsville	......	......	......	2.33	
Reading	77	24	47.3	2.31	0.6
Renovo	......	......	......	1.91	1.7
Saegerstown	79	16	39.5	3.10	1.0
St. Marys	77[f]	21[f]	40.5[f]	2.25	3.2
Saltsburg	......	......	......	1.74	
Seisholtzville	......	......	......	1.96	
Selinsgrove	78	20	45.6	1.96	1.8
Shawmont	......	......	......	2.52	......
Skidmore	79[d]	12[d]	41.0[d]	2.91	......
Smiths Corners	......	......	......	3.09	
Somerset	78	10	39.2	4.42	16.0
South Eaton	73	20	42.6	1.25	T.
Springdale	......	......	......	2.30	2.0
Springmount	......	......	......	3.29	
State College	72	16	41.6	2.75	8.0
Towanda	74	20	40.8	2.28	4.3
Uniontown	83	17	45.0	2.15	3.0
Warren	80	8	40.6	3.42	2.2
Wellsboro	72	16	40.8	3.28	3.3
Westchester	79	21	45.6	2.65	1.5
West Newton	......	......	......	2.00	1.0
Whitehaven	73	17	40.4	1.73	
Wilkesbarre	76	20	44.4	1.55	1.0
Williamsport	75	21	44.8	2.14	3.0
Rhode Island.					
Bristol	59	27	42.0	2.13	1.5
Kingston	68	23	41.0	4.04	2.0
Pawtucket	......	......	......	4.04	
Providence	71	28	44.4	4.61	7.0
South Carolina.					
Aiken	87	29	57.0	4.15	
Allendale	85	31	57.0	4.39	
Anderson	81	25	55.0	6.02	
Batesburg	86	26	55.8	4.25	
Beaufort	79	32	59.0	3.73	
Bennettsville	86	26	56.2	3.74	
South Carolina—Cont'd.					
Blackville	89	29	59.4	4.50	
Blairs	......	......	......	3.78	
Bowman	87	26	58.7	7.52	
Calhoun Falls	......	......	......	3.40	
Camden	84	24	55.5	3.04	
Catawba	......	......	......	4.36	
Chappells	......	......	......	3.78	
Cheraw	85	28	55.0	4.99	
Clarks Hill	85	27	56.0	3.65	
Clemson College	79	27	54.8	4.67	
Conway	83	27	56.7	7.89	
Darlington	88	25	56.6	3.94	
Dillon	86[e]	24[e]	55.7[e]	3.24	
Due West	81	28	55.6	3.14	
Edisto	......	......	......	9.07	
Effingham	......	......	......	5.13	
Florence	87	26	56.1	4.35	
Georgetown	80	30	57.8	6.03	
Greenville	79	22	50.8	3.37	
Greenwood	83	29	54.6	3.52	
Heath Springs	85	21	56.5	4.52	
Kingstree	84	39	60.4	6.04	
Liberty	82	22	55.0	4.81	T.
Little Mountain	84	29	55.5	3.83	
Newberry	86	24	56.5	3.26	T.
Pinopolis*[1]	80	34	58.3	4.37	
St. George	84	31	58.9	5.50	
St. Matthews	83	30	56.4	5.38	
St. Stephens	......	......	......	6.65	
Saluda	85	21	56.0	2.86	
Santuck	83	24	54.5	4.78	
Smiths Mills	......	......	......	7.80	
Society Hill	83	28	56.0	2.66	
Spartanburg	83	22	53.7	3.72	
Stateburg	86	30	58.1	3.38	
Summerville	86	28	59.2	5.38	
Trenton	85	30	56.3	3.51	
Trial	85	26	57.4	5.05	
Walhalla	86	20	53.4	5.67	
Walterboro	86	28	59.5	4.08	
Winnsboro	84	27	54.7	2.40	
Winthrop College	81	25	53.9	3.36	
Yemassee	84	28	57.4	4.05	
Yorkville	86	27	55.8	3.62	
South Dakota.					
Aberdeen	78	13	37.7	0.60	1.0
Academy	78	16	41.0	1.33	8.0
Alexandria	71	14	39.9	0.97	4.0
Armour	74	16	40.0	1.75	10.5
Ashcroft	72	10	36.4	0.40	4.0
Bowdle	74	12	37.4	0.65	4.5
Brookings	66	11	36.0	1.67	12.5
Canton	70	12	38.0	0.29	T
Castlewood	61	12	34.6	0.33	1.0
Centerville	70	18	38.6	0.46	3.5
Chamberlain	84	14	41.3	1.43	8.0
Cherry Creek	82	12	41.2	0.75	......
Clark	71	12	35.4	0.77	7.5
Clear Lake	70	12	34.3	0.15	0.5
Desmet	68	4	35.4	0.84	3.0
Elkpoint	74	15	41.9	0.36	2.0
Fairfax	74	10	42.8	0.47	4.0
Farmingdale	......	......	......	0.35	T.
Faulkton	77	11	37.2	0.73	2.4
Flandreau	68	13	36.4	1.94	12.0
Forestburg	74	11	37.5	1.74	10.0
Fort Meade	78	9	38.6	0.85	8.5
Frederick	76	13	35.1	0.57	2.7
Gannvalley	81	12	39.5	0.88	7.0
Greenwood	72	17	42.2	1.12	5.5
Gregory	78	10	43.8	1.00	6.0
Highmore	79	11	38.8	0.68	2.0
Howard	68[1]	12[1]	36.6[1]	0.52	T.
Howell	82	11	37.4	0.76	3.8
Ipswich	76	11	36.1	0.92	3.0
Kenebec	80	13	41.9	1.13	......
Kidder	70	4	32.9	0.10	T.
Kimball	78	14	39.2	1.24	......
La Delle	75	11	37.2	0.89	3.0
Leola	85	10	37.0	0.50	T.
Marion	74	17	40.8	1.03	4.0
Mellette	79	12	38.0	0.58	0.2
Menno	70	11	39.6	0.85	4.0
Milbank	65	13	34.9	0.73	5.6
Mitchell	73	11	38.0	1.68	14.2
Mound City	77	11	37.4	0.10	T.
Orman	76	9	40.6	1.45	13.0
Plankinton	73	15	39.4	1.20	1.3
Ramsey	69	8	35.7	1.85	12.0
Redfield	79	12	36.7	0.54	1.2
Roslyn	66	13	34.0	0.38	3.0
Sioux Falls	78	15	39.4	0.49	
Stephan	78	10	38.0	0.62	4.2
Spearfish	78	11	39.8	1.07	......
Tyndall	73	10	43.3	0.84	4.4
Vermillion	73	19	41.6	0.20	2.0
Watertown	65[e]	13[e]	34.9[e]	0.61	3.0
Wentworth	67	14	36.1	1.58	10.9
South Dakota—Cont'd.					
Whitehorse	......	......	......	0.11	1.1
Woolsey	......	......	......	1.16	4.3
Tennessee.					
Arlington	83	30	52.0	4.24	
Ashwood	80	25	51.2	3.70	
Benton	79	23	53.1	3.67	
Birds Bridge	......	......	......	4.17	
Bluff City	......	......	......	3.60	T.
Bolivar	83	28	52.2	4.92	
Bristol	83	21	49.6	3.71	1.0
Brownsville	82	31	52.3	6.47	
Byrdstown	83	26	51.2	3.00	1.0
Carthage	85	27	52.2	3.16	
Cedar Hill	84	27	52.0	2.65	T.
Celina	......	......	......	2.75	
Charleston	......	......	......	6.80	
Clarksville	82	29	51.2	3.33	T.
Clinton	......	......	......	4.50	T.
Covington	85[e]	31[e]	52.2[e]	6.00	
Dandridge	......	......	......	3.89	
Decatur	81	22	52.4	4.97	T.
Dickson	85	26	52.6	4.38	T.
Dover	86	25	52.8	3.68	
Dyersburg	84	31	52.2	7.54	
Elizabethton	82	20	48.2	3.30	2.5
Erasmus	77	14	47.5	6.20	0.6
Florence	80	28	51.8	3.14	T.
Franklin	78	26	50.8	4.32	T.
Halls Hill	......	......	......	2.79	T.
Harriman	78	25	51.0	4.59	T.
Hohenwald	82	24	50.7	4.93	
Iron City	79	22	53.4	4.73	
Jackson	82	28	54.8	4.94	
Johnsonville	84	24	53.2	4.00	
Jonesboro	78[f]	22[f]	47.3[f]	3.98	1.0
Kenton	83	28	52.8	6.25	
Kingston	......	......	......	4.57	T.
Lafayette	82	25	51.0	2.70	0.2
Lewisburg	87	23	51.6	3.11	T.
Loudon	......	......	......	3.99	
Lynnville	77	26	51.9	4.66	T.
McGee	......	......	......	4.37	
McMinnville	82	24	51.8	3.49	0.1
Maryville	82	23	52.0	3.35	0.2
Milan	80	29	51.0	5.61	
Newport	79	24	51.4	3.62	T.
Palmetto	80	25	52.2	2.52	T.
Pope	83	23	52.9	5.65	
Rogersville	82	21	51.0	4.20	T.
Rugby	80	16	47.9	5.46	T.
Savannah	88	27[f]	54.2[e]	6.47	
Sevierville	82	21	51.6	3.34	T.
Sewanee	75	26	48.7	3.62	
Silver Lake	......	......	......	3.85	
Sparta	81	24	51.5	3.50	T.
Springdale	82	20	49.4	3.26	T.
Springville	82	23	51.6	5.43	
Tazewell	......	......	......	3.78	T.
Tellico Plains	82	22	53.6	4.85	T.
Tracy City	75	25	49.2	4.41	T.
Trenton	82	26	52.4	5.90	
Tullahoma	82	24	51.9	4.08	T.
Union City	83[e]	27[e]	52.9[e]	4.01	
Walling	......	......	......	3.45	
Waynesboro	80	23	52.2	6.80	T.
Wildersville	78	29	52.8	5.62	
Yukon	79	26	52.8	3.52	
Texas.					
Albany	93	31	61.3	0.38	
Alvin	......	......	......	4.97	
Arthur	......	......	......	4.51	
Austin	......	......	......	1.74	
Ballinger	......	......	......	0.20	
Barstow	92	35	64.2	0.15	
Beaumont	......	......	......	2.72	
Beeville	101	47	68.5	2.55	
Big Springs	......	......	......	0.22	
Blanco	......	......	......	2.01	
Boerne	98	33	64.8	2.40	
Bonham	88	36	58.8	3.86	
Booth	......	......	......	1.94	
Bowie	92	36	61.4	1.15	
Brenham	90	47	66.2	2.81	
Brighton	85	49	70.3	2.06	
Brownwood	96	34	46.6	1.40	
Canadian	83	27	54.0	5.00	4.0
Channing	88	23	55.9	2.67	10.0
Childress	90	30	59.3	0.80	
Chillicothe	......	......	......	0.98	
Claredon	86	27	57.0	1.68	......
Clarksville	87	40	59.8	5.38	
Claytonville	......	......	......	0.41	
Coleman	......	......	......	0.36	
College	82	42	62.2	3.73	
Colorado	96	30	63.8	0.34	
Columbus	......	......	......	2.47	
Corsicana	......	......	......	1.29	
Crockett	90	41	64.4	5.15	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Texas—Cont'd.	°	°	°	*Ins.*	*Ins.*
Cuero	97	43	68.0	3.71	
Dallas	93	39	61.4	2.86	
Dalhart				1.04	......
Danevang	87	42	68.1	4.17	
Decatur				1.49	
Denison				1.16	
Dialville				4.79	
Dublin	90	36	63.6	1.14	
Duval	94	40	66.8	2.90	
Eagle Pass	101	43	70.9	0.32	
Falfurrias	103	50	74.2	5.56	
Fort Clark	104	45	69.7	0.98	
Fort McIntosh	107	42	75.0	0.64	
Fredericksburg	100	36	65.2	1.83	
Gatesville				1.40	
Georgetown	99	40	66.9	3.88	
Gonzales				2.38	
Graham	95	31	61.6	2.11	
Grapevine	94	39	63.9	2.44	
Greenville	93	40	60.4	5.87	
Hallettsville	93	46	69.6	2.67	
Haskell	99	32	62.4	0.28	
Hebbronville				0.90	
Hereford	90	22	55.5	1.30	7.0
Hillsboro	97	34	64.8	2.58	
Hondo	100	45	71.8	2.67	
Houston	91	44	67.4	0.70	
Hubbard	96	39	62.8	1.96	
Huntsville	88	41	63.4	5.69	
Jewett	90	38	63.0	4.68	
Kaufmann	91	40	63.2	3.84	
Keene	93	37	63.6	2.23	
Kerrville	103	35	67.2	2.89	
Knickerbocker	95	32	65.9	0.33	
Kopperl				1.10	
Lampasas	101	35	63.6	1.28	
Lapara				1.32	
Laureles Ranch				0.90	
Liberty	91	40	66.7	2.65	
Llano				1.00	
Lone Star Ranch				0.50	5.0
Longview	86	41	60.4	5.71	
Lufkin	89	37	65.0	3.60	
Luling	96	45	66.4	5.29	
McLean	84	25	52.9	1.18	1.0
Mexia	93	41	61.4	1.80	
Miami	84	25	54.6	2.74	......
Mount Blanco	93	27	56.6	0.17	
Nacogdoches	85	38	61.0	4.65	
Nazareth	90	22	53.8	1.96	3.0
New Braunfels	95	44	67.6	2.11	
Orange				2.10	
Panter				2.33	
Paris	88	41	58.4	3.90	
Pierce				4.85	
Plemons	87	21	51.8	1.51	6.0
Port Lavaca	86	48	69.4	2.57	
Quanah	89	33	60.8	1.00	
Rhineland	100	31	59.2	1.00	
Riverside				4.07	
Rockisland	93	42	66.8	1.98	
Rockland				3.89	
Rockport				1.25	
Sabinal	105	37	70.2	1.77	
San Marcos	89	43	66.2	6.16	
San Saba	100	35	66.2	1.10	
Santa Gertrude				2.93	
Seymour	94	35	60.1	3.10	
Sherman	82	40	59.8	4.02	
Sonora	98	28	64.8	0.57	
Sugarland	90	42	68.2	2.35	
Sulphur Springs	87	40	60.0	5.43	
Temple	100	37	62.6	2.62	
Texline	90	22	52.0	3.30	1.8
Trinity	90	30	65.0	4.74	
Valley Junction				2.25	
Victoria	99	40	69.4	3.96	
Waco	100	44	65.9	3.92	
Waxahachie	99	37	61.8	1.88	
Weatherford	91	37	62.7	1.54	
Wharton	97	42	66.2	2.18	
Wichita Falls	93	32	61.2	1.30	
Willis	90	43	67.5	2.01	
Willspoint	89	37	60.2	4.06	
Utah.					
Alpine				2.10	
Aneth	84	26	57.0	0.52	
Beaver	78	23	54.0	1.43	
Blackrock	84	21	50.8	0.52	
Castledale	81	13	49.4	0.40	
Castlerock				1.05	2.0
Cedar City	76	22	50.6	0.88	
Corinne	84	26	51.2	1.26	
Deseret	83	15	49.8	0.10	
Emery	78	18	49.0	0.40	
Enterprise				0.96	
Escalante	82	22	50.8	0.64	
Experiment Farm	88	31	58.6	......	
Utah—Cont'd.					
Farmington	75	28	50.9	0.28	T.
Fillmore	86	22	54.1	0.55	
Frisco	80	16	45.8	......	
Garrison	81	19	52.7	T.	
Government Creek	76	19	48.0	0.27	
Grayson	85	17	52.7	1.73	10.0
Heber	76	17	45.6	1.32	
Henefer	76	17	45.2	2.36	......
Hite	91	36	61.8	0.82	
Huntsville				2.42	
Ibapah[j]	71	13	42.5	......	......
Karnab	81[h]	17[h]	46.9[h]	1.40	
Kelton				T.	
Levan	78	21	48.6	1.19	T.
Loa	73	10	41.1	0.00	
Logan	74	16	47.0	1.58	
Manti	78	18	48.0	0.92	.....
Marion				1.55	4.0
Marysvale	81	16	48.3	0.97	0.1
Meadowville	64	15	41.4	2.75	6.5
Millville				1.65	
Minersville				0.65	......
Moab	89	27	57.4	0.36	
Morgan	77	19	47.0	1.14	
Mount Nebo	78	28	51.8	0.54	
Mount Pleasant	79	18	48.2	1.51	
Nephi				1.28	T.
Oak City	83	21	52.0	0.69	
Ogden	78	30	52.6	1.65	T.
Park City	71	13	41.2	0.47	1.7
Parowan	82	22	50.4	1.23	T.
Payson				1.14	
Plateau	77	10	43.5	1.40	8.2
Provo	80	24	51.6	1.30	1.0
Ranch	75	18	44.9	2.02	
Randolph				1.09	3.5
Richfield	85	21	52.8	0.02	
St. George	95	34	62.6	0.82	
Saltair	70	31	51.8	0.74	
Scipio	81	14	48.0	1.19	
Snowville	75	16	44.4	0.52	
Soldier Summit	58	2	34.9	1.70	17.0
Sunnyside				0.78	4.5
Theodore	77	19	48.2	0.15	0.3
Thistle	80	15	48.8	1.70	3.0
Tooele	74	23	50.5	0.82	
Tropic	78	28	48.5	1.21	
Trout Creek	82	20	50.6	0.00	
Vernal	82	27	52.4	0.41	1.0
Wellington	90	18	52.2	0.10	
Woodruff	71	14	41.0	1.00	2.0
Vermont.					
Bloomfield	71	8	35.2	2.43	15.4
Cavendish	74[d]	13[d]	39.8[d]	2.19	8.0
Chelsea	70	10	34.0	5.37	20.0
Cornwall	69	15	39.2	2.90	13.0
Enosburg Falls	69	10	37.6	2.29	10.5
Jacksonville	72	12	35.2	2.32	17.0
Manchester	71	17	38.4	3.02	10.2
Norwich				3.38	13.0
St. Johnsbury	72	10	38.2	4.60	16.2
Wells	70	14	36.8	3.75	13.0
Woodstock	70	12	35.6	3.57	17.0
Virginia.					
Arvonia	88	22	50.4	4.19	2.0
Ashland	85	25	50.0	4.12	T.
Bigstone Gap	81	21	48.8	4.05	T.
Blacksburg	78	19	42.6	4.39	0.5
Buchanan				3.96	
Burkes Garden	73	15	40.6	5.17	10.0
Callaville	82	25	49.2	3.52	
Charlottesville	86	21	49.2	3.98	1.0
Columbia	84	26	49.8	4.65	
Dale Enterprise	81	17	46.2	3.42	5.5
Danville				4.06	T.
Dinwiddie	84	20	49.5	3.91	
Doswell	88	24	50.7	4.19	
Elk Knob	78	21	47.2	3.36	T.
Fredericksburg	86	23	49.5	4.42	T.
Grahams Forge	79	21	45.0	2.80	T.
Hampton	76	28	51.8	4.06	
Hot Springs	77	16	43.0	3.28	2.0
Ivanhoe				3.98	0.5
Lexington	82	22	47.5	3.60	1.2
Lincoln	84	17	47.6	4.93	1.2
Marion	77	19	46.1	3.18	2.0
Mendota				4.59	1.0
Newport News	82	27	50.4	4.68	T.
Nokesville (near)	85	21	48.8	4.97	5.0
Petersburg	83	22	......	3.25	
Quantico	83	21	49.0	4.43	3.2
Radford				3.72	
Randolph				2.44	
Riverton				3.21	
Roanoke	89	26	51.4	4.14	T.
Rockymount	81	25	48.8	4.85	T.
Shenandoah				3.18	0.8
Speers Ferry				5.88	3.0
Virginia—Cont'd.					
Spottsville	82	26	50.2	4.22	T.
Staunton	82	20	48.0	3.42	3.6
Stephens City	83	17	47.4	3.44	......
Warsaw	84	22	49.2	3.64	
Williamsburg	84	25	50.6	6.40	2.0
Woodstock	83	19	48.2	3.41	1.6
Washington.					
Aberdeen	75	30	48.4	5.56	
Anacortes	63	33	47.0	0.92	
Ashford				4.67	2.5
Baker	77	29	49.6	4.65	
Bellingham	66	27	48.4	1.87	
Cedonia	66	21	43.2	1.10	
Centralia	78	28	48.8	3.72	
Cheney	74	14	43.0	1.05	
Clearbrook	71	22	46.4	3.12	
Clearwater	76	32	48.8	14.04	
Cle Elum	75	20	42.5	1.94	
Colfax	77	17	46.6	0.63	
Colville	77	16	44.8	0.91	
Conconully	71	23	43.6	0.95	0.5
Coupeville	65	31	48.4	1.52	
Crescent	74	18	44.9	0.71	T.
Cusick	82	18	45.9	1.80	
Easton				3.00	25.0
East Sound	66	26	45.0	1.89	
Ellensburg	77	20	46.3	0.30	
Ephrata	78	25	50.2	0.02	
Fort Simcoe	73	32	49.4	0.81	
Goldendale	71	23	45.4	1.55	
Granite Falls				4.20	
Hatton	77	20	48.2	0.17	T.
Kennewick	79	25	52.2	0.06	
Kiona	80	24	51.2	0.15	
Kosmos	79	31	48.3	4.45	
Lacenter	80	29	48.6	3.69	
Lakeside	73	30	49.4	0.08	T.
Lester	74	26	44.6	5.20	13.5
Lucerne	72	30	47.0	2.40	
Merritt				4.73	19.0
Mottinger Ranch	89	31	54.8	0.47	
Mount Pleasant	77	34	50.9	5.64	
Moxee	78	19	48.6	0.19	
Northport	73	13	41.6	0.81	T.
Odessa	75	22	47.3	0.19	
Olga	62	34	47.4	2.22	
Olympia	75	29	49.1	3.79	
Pinehill	80	27	49.0	2.73	T.
Pomeroy	67	20	45.2	0.54	T.
Port Townsend	68	34	48.0	1.64	
Pullman	79[e]	25[b]	47.8[e]	0.73	1.5
Quiniault	77	31	48.3	13.33	
Rattlesnake	68	28	45.4	0.65	1.0
Rex Creek	71	32	49.0	1.43	
Rock Lake				0.66	
Rosalia	71	21	44.4	0.53	
Ruby Hill	70	20	42.6	0.67	7.5
Sedro	69	30	47.6	3.15	
Sixprong	74	32	49.9	0.54	
Snohomish	70	28	47.6	2.97	
Snoqualmie	75	28	47.4	3.84	
Stehekin	70	29	45.0	2.21	
Stokes	70	21	43.3	0.18	
Touchet	78	24	51.2	0.40	
Twisp	79	22	45.9	0.55	T.
Union				7.19	1.5
Vancouver	79	32	50.8	2.81	
Vashon	69	30	48.3	2.85	
Wahluke	79	26	52.2	T.	
Waterville	72	20	43.0	0.22	1.5
Wenatchee (near)	72	28	46.4	0.63	2.0
Wilbur	74	16	44.0	0.45	1.0
Yale	82	31	50.6	6.44	
Zindel	77	29	52.6	1.17	
West Virginia.					
Bancroft	84	21	46.0	3.54	1.8
Bayard	77	10	40.2	3.60	16.0
Beckley	77	18	44.2	5.44	7.5
Bens Run	83	20	46.7	3.78	2.0
Berkley Springs	84	18	47.4	3.75	19.0
Burlington	83	17	45.8	1.89	T.
Cairo	85	18	47.4	3.45	......
Central	84	16	44.8	2.73	4.0
Charleston	85	24	49.2	3.59	1.2
Creston	89	18	46.2	3.38	4.0
Cuba	83	19	46.2	3.42	5.2
Davis				4.30	
Elkhorn	77	21	45.3	3.87	5.4
Fairmont	85	18	45.8	2.71	......
Franklin	82	16	45.2	2.62	1.2
Glenville	88	18	47.6	3.79	4.0
Grafton	82	16	45.0	2.41	4.0
Green Sulphur Springs	80	19	45.5	3.90	1.0
Harpers Ferry				4.54	0.5
Hinton	81[e]	23[e]	48.0[e]	4.29	3.0
Huntington	86	23	46.8	2.80	1.0
Leonard	72	15	41.6	5.40	21.0
Lewisburg	79	19	44.2	4.37	2.0

TABLE II.—*Climatological record of cooperative observers*—Continued. *Late reports for March, 1907.*

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
West Virginia—Cont'd.	°	°	°	*Ins.*	*Ins.*
Logan	87	25	51.0	4.24	3.0
Lost City	75	17	44.7	2.95	3.0
Lost Creek	83	17	45.2	1.97	2.0
Marlinton	78	16	42.2	.....	.....
Mannington	84	17	46.2	3.14	7.8
Martinsburg	82	19	45.2	3.32	0.3
Moorefield	85	15	46.2	1.75	8.0
Mooresville	.....	.....	.....	2.32	.....
Morgantown	81	15	44.0	2.79	3.0
Moundsville	84	20	47.2	3.25	0.5
New Cumberland	81	15	43.2	3.80	1.0
New Martinsville	81	27	48.2	3.78	T.
Nuttallburg	.....	.....	.....	2.43	8.0
Oceana	84	21	49.3	4.29	0.3
Parsons	82	11	41.7	4.14	23.0
Philippi	84	14	45.4	3.24	10.4
Pickens	79	12	40.7	6.66	40.0
Point Pleasant	86	22	48.8	2.69	2.0
Powellton	87	27	49.6	2.39	T.
Princeton	77	15	42.3	6.45	16.0
Romney	82	18	46.4	1.42	.....
Rowlesburg	.....	.....	.....	3.86	9.6
Ryan	85	17	46.4	3.75	4.5
Smithfield	.....	.....	.....	3.21	0.2
Southside	85	21	47.2	2.85	2.5
Spencer	86	15	44.0	3.90	0.6
Sutton	92	21	49.6	5.77	15.0
Terra Alta	78	10	39.8	2.92	15.8
Union	79	23	44.9	3.25	.....
Uppertract	80	16	46.1	1.42	1.5
Wellsburg	77	15	42.6	4.09	7.1
Weston	90	16	46.2	3.54	8.0
Wheeling	.....	.....	.....	2.70	0.5
Williamson	85	25	49.8	4.04	1.0
Wisconsin.					
Amherst	63	14	35.7	3.00	30.0
Antigo	65	10	31.6	1.80	18.0
Appleton	65	17	36.6	3.74	26.0
Appleton Marsh	67	15	37.2	2.97	9.9
Ashland	54	9	33.2	1.94	.....
Barron	62	14	37.2	0.70	.....
Beloit	66	20	39.4	2.97	
Black River Falls	.....	.....	.....	0.50	4.0
Brodhead	70	17	40.1	3.61	3.0
Burnett	66[d]	20[d]	37.0[d]	2.43	11.5
Butternut	56	5	31.6	1.06	10.2
Cecil	64	13	36.0	2.80	21.1
Chilton	64	17	35.2	4.00	16.8
Chippewa Falls	.....	.....	.....	1.44	4.0
City Point	.....	.....	.....	2.20	
Dodgeville	65	17	40.0	1.50	3.0
Downing	.....	.....	.....	1.26	12.0
Eau Claire	67	16	38.6	1.20	5.0
Florence	55	1	30.0	2.38	21.5
Fond du Lac	69	18	39.8	3.90	10.5
Grand Rapids	66	16	36.9	2.70	12.5
Grand River Locks	.....	.....	.....	2.89	10.0
Grantsburg	63	10	35.6	0.85	7.5
Hancock	64	14	36.2	2.51	14.5
Hayward	60	6	32.4	0.66	5.5
Hillsboro	68	13	37.0	2.25	6.0
Koepenick	65	0	33.5	2.80	26.0
Lake Mills	68	19	37.8	4.29	7.9
Lancaster	70	19	40.8	1.98	
Manitowoc	64	19	35.8	3.05	12.0
Mauston	66	17	38.8	3.01	10.0
Meadow Valley	69	15	36.2	2.45	15.0
Medford	67	14	35.6	0.50	5.0
Menasha	.....	.....	.....	2.87	19.0
Merrill	67	12	34.2	2.38	14.0
Minocqua	55	6	29.6	2.00	20.0
Mount Horeb	70	16	38.7	3.66	7.2
Neillsville	66	16	38.0	2.33	9.5
New London	66	17	36.2	3.60	32.0
New Richmond	68	16	37.8	1.40	6.0
Oconto	62	15	34.8	2.35	17.0
Osceola	65	12	35.6	1.05	7.0
Oshkosh	66	15	37.2	2.82	.....
Pine River	68	15	36.8	3.47	15.4
Portage	69	19	39.1	2.64	6.0
Port Washington	72	20	36.4	3.67	8.0
Prairie du Chien	72	19	41.3	1.17	.....
Prentice	60	5	32.4	1.65	10.8
Racine	69	20	38.4	2.53	.....
Sheboygan	68	21	37.0	2.42	13.0
Shullsburg	67	13	39.4	2.97	6.0
Solon Springs	59	1	31.8	0.87	5.5
Spooner	63	8	34.7	1.13	8.1
Stanley	65	14	36.0	1.80	7.0
Stevens Point	68	15	36.1	2.21	16.5
Sturgeon Bay	60	12	33.4	5.46	12.0
Valley Junction	64	13	36.8	2.71	14.5
Viroqua	66	21	38.9	2.12	10.0
Watertown	70	18	36.6	2.89	4.5
Waukesha	.....	.....	.....	3.14	9.5
Waupaca	67	17	37.2	3.07	27.0
Wausau	61	14	34.8	1.93	20.0

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Wisconsin—Cont'd.	°	°	°	*Ins.*	*Ins.*
Weyerhauser	67	11	34.4	0.97	9.0
Whitehall	65[e]	14[e]	37.2[e]	.....	.....
Wyoming.					
Afton	68	11	40.3	1.99	11.0
Barnum	.....	.....	.....	1.00	10.1
Basin	76	15	44.8	0.41	.....
Bedford	60	7	37.7	0.63	2.5
Blue Cap	59	3	32.4	1.80	18.0
Border	66	16	39.6	1.35	.....
Buffalo	75	10	37.9	1.15	10.0
Camp Colter	75	9	41.0	0.18	0.5
Chugwater	78	12	41.4	0.84	8.0
Clark	72	16	41.8	1.43	6.5
Clear Creek Cabin	58	− 1	28.8	1.16	18.0
Daniel	54	5	31.3	1.10	8.0
Dubois	60	10	37.0	0.97	9.8
Elk Mountain	.....	.....	.....	2.07	34.0
Evanston	67	12	40.5	1.03	3.0
Experiment Farm	.....	.....	.....	0.29	6.2
Fayette	61	6	35.4	0.37	.....
Fontenelle	70	12	37.0	0.60	6.0
Fort Laramie	82	11	42.8	0.45	.....
Granite Canyon	67	0	36.8	2.09	21.0
Granite Springs	68	8	38.6	2.83	22.5
Green River	72	14	43.8	0.34	8.5
Griggs	75	11	39.7	0.79	6.0
Hatton	.....	.....	.....	3.80	34.0
Hyattville	85	13	44.1	.....	.....
Jackson	61	14	38.2	0.81	.....
Kirtley	72	9	37.8	0.43	5.0
Laramie	67	8	37.1	0.78	2.8
Leo	66	− 1	37.6	0.45	1.8
Little Medicine	66	7	34.5	1.01	9.5
Lolabama Ranch	60	− 5	34.6	0.00	.....
Lusk	77	10	38.2	0.65	6.5
Moorcroft	75	11	39.4	0.60	6.0
Moore	72	11	40.2	0.77	.....
New Castle	70	11	38.0	0.75	7.5
Pathfinder	70	11	42.5	0.30	1.5
Phillips	79	11	41.2	1.22	7.0
Pine Bluff	82	10	45.6	T.	T.
Pinedale	62	4	34.4	1.07	.....
Rawlins	67	10	40.2	T.	T.
Saratoga	69	13	42.0	1.01	3.0
Sheridan	74	14	40.4	2.50	18.0
Shoshone Canyon	67	12	41.0	0.69	6.3
South Pass City	57	2	28.1	4.30	43.0
Ten Sleep	76	11	40.5	0.32	3.2
Wells	48	− 9	27.5	0.59	4.0
Wheatland	82	8	42.6	1.80	17.5
Wolf	74	15	39.8	5.00	50.0
Wyncote	80	14	44.0	0.55	3.0
Yellowstone Pk. (Fount'n)	.....	.....	.....	0.60	6.0
Yellowstone Pk. (G. Can.)	55	− 6	28.4	0.98	16.1
Yellowstone Pk. (Lake)	60	− 6	29.9	3.09	23.0
Yellowstone Pk. (Norris)	60	− 3	32.5	.....	.....
Yellowstone Pk. (Riv'side)	60	2	33.0	1.04	9.0
Yellowstone Pk. (S. River)	.....	.....	.....	1.08	.....
Yellowstone Pk. (Soda B.)	64	2	37.4	0.18	1.0
Yellowstone Pk. (T. Sta.)	55	− 1	31.4	0.71	.....
Yellowstone Pk. (Up. Ba.)	60	− 6	31.4	0.96	9.0
Porto Rico.					
Adjuntas	83	55	69.4	.....	
Aguirre	96	60	78.2	0.14	
Aibonita	86	48	70.2	1.95	
Alto de La Bandera	86	66	75.0	2.09	
Anasco	94	50	76.1	1.79	
Arecibo	91	53	72.2	2.22	
Barros	86	52	70.3	1.14	
Bayamon	94	56	73.2	1.76	
Caguas	94	50	73.9	0.80	
Canovanas	90	66	77.8	2.61	
Cayey	89	49	69.5	0.96	
Cidra	89	50	71.8	0.31	
Carozal	91	54	74.2	1.77	
Fajardo	90	61	77.4	1.33	
Guanica	.....	.....	.....	0.33	
Hacienda Colosa	90	57	74.2	0.11	
Humacao	87	59	75.0	0.44	
Isabel	90	63	76.6	0.35	
Isolina	89	56	71.8	1.75	
Juana Diaz	93	61	77.7	0.76	
La Carmelita	85	57	71.1	1.21	
Lares	91	54	72.6	2.66	
Manati	95	59	76.5	2.05	
Maricao	90	52	70.6	.....	
Maunabo	91	61	78.9	0.91	
Mayaguez	93	59	75.0	0.55	
Ponce	93	60	76.4	0.03	
Rio Blanco	88	55	74.6	1.27	
Rio Piedras	.....	.....	.....	1.70	
San German	88	56	73.6	2.55	
San Lorenzo	91	52	73.0	0.96	
San Salvador	91[e]	57[e]	71.0[e]	1.39	
Santa Isabel	88[d]	63[d]	76.4[d]	0.00	
Vieques	89	64	75.3	0.40	
Yabucoa	.....	.....	.....	1.83	
Yauco	88	58	74.0	0.44	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
New Brunswick.	°	°	°	*Ins.*	*Ins.*
St. John	51	20	33.9	4.34	15.4

Late reports for March, 1907.

Stations.	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Alaska.					
Central	.....	.....	.....	2.57	24.0
Circle City	35	−45	2.7	0.28	3.2
Coal Harbor	55	1	32.8	1.43	T.
Dutch Harbor	57	20	37.2	2.93	
Fort Egbert	40	−42	4.6	0.00	
Fort Gibbon	53	−40	8.3	0.53	5.0
Fort Liscum	38	3	20.6	6.04	63.0
Kenai	40	−28	14.4	0.67	8.8
Ketchemstock	33	−53	−5.0	0.27	4.0
North Fork	31	−52	−6.4	0.27	3.0
Rampart	38	−42	3.6	1.17	12.8
Tyonok	44	− 8	.....	1.66	33.0
Arizona.					
Tuba	84	18	50.2	0.23	T.
Arkansas.					
Winchester	89	35	65.8	5.06	
California.					
San Miguel Island	.....	.....	.....	4.62	
Connecticut.					
New London	75	14	38.3	2.98	6.2
Illinois.					
Rockford	81	15	42.0	1.90	1.0
Tuscola	87	23	47.2	4.05	6.0
Iowa.					
Knoxville	87	17	43.8	1.20	3.0
Louisiana.					
Lake Charles	.....	.....	.....	1.10	
Maine.					
North Bridgton	64	− 6	30.4	3.68	26.0
Houlton	48	−20	25.6	1.70	17.0
Massachusetts.					
Fall River	74	15	38.2	2.44	9.5
North Dakota.					
Edmore	54	−15	18.6	.....	.....
North Carolina.					
Marshall	83	28	53.6	0.00	.....
Oklahoma.					
Meeker	98	30	59.4	0.75	
Oregon.					
Grass Valley	.....	.....	.....	1.60	2.0
Lost River	63	8	35.4	2.48	9.1
Texas.					
Hillsboro	93	35	68.4	1.60	T.
Kaufman	89	39	67.2	2.51	
Vermont.					
Cornwall	65	− 6	32.1	0.37	4.0
Wyoming.					
Border	50	− 8	29.0	2.08	.....
Camp Colter	69	1	35.2	0.91	1.8
Fontenelle	50	− 8	28.6	0.70	7.0
Fort Washakie	68	9	38.5	0.60	6.0
Lolabama Ranch	59	3	29.4	2.58	17.0
Yellowstone Pk. (S. River)	45[e]	− 2	25.4[d]	5.88	.....

EXPLANATION OF SIGNS.

* Extremes of temperature from observed readings of dry thermometer.

A numeral following the name of a station indicates the hours of observation from which the mean temperature was obtained, thus:

[1] Mean of 7 a. m. + 2 p. m. + 9 p. m. + 9 p. m. ÷ 4.
[2] Mean of 8 a. m. + 8 p. m. ÷ 2.
[3] Mean of 7 a. m. + 7 p. m. ÷ 2.
[4] Mean of 6 a. m. + 6 p. m. ÷ 2.
[5] Mean of 7 a. m. + 2 p. m. ÷ 2.
[6] Mean of readings at various hours reduced to true daily mean by special tables.

The absence of a numeral indicates that the mean temperature has been obtained from daily readings of the maximum and minimum thermometers.

An italic letter following the name of a station, as "Livingston *a*," "Livingston *b*," indicates that two or more observers, as the case may be, are reporting from the same station. A small roman letter following the name of a station, or in figure columns, indicates the number of days missing from the record; for instance, "n" denotes 14 days missing.

No note is made of breaks in the continuity of temperature records when the same do not exceed two days. All known breaks of whatever duration, in the precipitation record receive appropriate notice.

CORRECTIONS.

March, 1907.

Utah, Theodore, make mean temperature 40.6.

Table III.—*Wind resultants, from observations at 8 a. m. and 8 p. m., daily, during the month of April, 1907.*

Stations.	Component direction from—				Resultant.	
	N.	S.	E.	W.	Direction from—	Duration.
New England.	*Hours.*	*Hours.*	*Hours.*	*Hours.*	°	*Hours.*
Eastport, Me	21	17	11	24	n. 72 w.	13
Portland, Me	27	14	10	23	n. 45 w.	18
Concord, N. H.†	15	8	6	11	n. 36 w.	9
Burlington, Vt.†	9	12	4	10	s. 63 w.	7
Northfield, Vt	30	20	7	17	n. 45 w.	14
Boston, Mass	19	10	13	27	n. 57 w.	17
Nantucket, Mass	19	18	11	26	n. 86 w.	15
Block Island, R. I	21	15	11	29	n. 72 w.	19
Narragansett, R. I	6	3	10	14	n. 53 w.	5
Providence, R. I	22	10	11	29	n. 56 w.	22
Hartford, Conn	28	14	7	23	n. 49 w.	21
New Haven, Conn	25	14	12	30	n. 36 w.	14
Middle Atlantic States.						
Albany, N. Y	23	19	5	9	n. 45 w.	6
Binghamton, N. Y.†	8	2	11	13	n. 18 w.	6
New York, N. Y	22	16	13	21	n. 53 w.	10
Harrisburg, Pa	19	11	18	25	n. 41 w.	11
Philadelphia, Pa	26	13	11	24	n. 45 w.	18
Scranton, Pa	28	10	14	22	n. 24 w.	20
Atlantic City, N. J	23	12	14	25	n. 45 w.	16
Cape May, N. J	24	13	14	19	n. 24 w.	12
Baltimore, Md	26	13	11	20	n. 35 w.	16
Washington, D. C	24	12	15	22	n. 30 w.	14
Lynchburg, Va	24	17	12	24	n. 60 w.	14
Mount Weather, Va	25	15	11	29	n. 61 w.	21
Norfolk, Va	24	17	10	18	n. 49 w.	11
Richmond, Va	22	21	10	16	n. 80 w.	6
Wytheville, Va	12	10	13	35	n. 85 w.	22
South Atlantic States.						
Asheville, N. C	28	20	13	16	n. 21 w.	8
Charlotte, N. C	10	17	17	22	n. 68 w.	5
Hatteras, N. C	29	13	13	20	n. 24 w.	18
Raleigh, N. C	21	17	11	22	n. 70 w.	12
Wilmington, N. C	19	16	13	23	n. 73 w.	10
Charleston, S. C	20	20	12	20	w.	8
Columbia, S. C	18	20	14	23	s. 77 w.	9
Augusta, Ga	18	24	10	21	s. 61 w.	12
Savannah, Ga	18	20	10	21	s. 80 w.	11
Jacksonville, Fla	26	17	16	18	n. 13 w.	9
Florida Peninsula.						
Jupiter, Fla	16	20	12	26	s. 74 w.	15
Key West, Fla	20	17	25	14	n. 75 w.	11
Sand Key, Fla†	8	12	14	4	s. 68 e.	11
Tampa, Fla	23	17	9	27	n. 72 w.	19
Eastern Gulf States.						
Atlanta, Ga	20	15	14	29	n. 72 w.	16
Macon, Ga.†	13	8	6	9	n. 31 w.	6
Thomasville, Ga	15	23	18	17	s. 7 e.	8
Pensacola, Fla.†	13	7	11	8	n. 27 e.	7
Anniston, Ala	22	24	10	14	s. 63 w.	4
Birmingham, Ala	24	14	14	18	n. 22 w.	11
Mobile, Ala	22	22	15	15	......	......
Montgomery, Ala	19	19	14	18	w.	4
Meridian, Miss	22	16	19	18	n. 9 e.	6
Vicksburg, Miss	20	15	25	15	n. 63 e.	11
New Orleans, La	17	24	9	10	s. 8 w.	7
Western Gulf States.						
Shreveport, La	18	23	25	10	s. 72 e.	16
Bentonville, Ark.†	14	7	12	6	n. 41 e.	9
Fort Smith, Ark	20	9	31	11	n. 61 e.	23
Little Rock, Ark	23	17	21	14	n. 49 e.	9
Corpus Christi, Tex	17	27	25	4	s. 65 e.	23
Fort Worth, Tex	20	24	19	13	s. 56 e.	7
Galveston, Tex	14	27	21	6	s. 49 e.	20
Palestine, Tex	21	24	21	8	s. 77 e.	13
San Antonio, Tex	18	23	30	6	s. 78 e.	24
Taylor, Tex.†	10	13	3	6	s. 45 w.	4
Ohio Valley and Tennessee.						
Chattanooga, Tenn	21	20	15	17	n. 63 w.	2
Knoxville, Tenn	23	21	11	23	n. 81 w.	12
Memphis, Tenn	24	16	25	12	n. 58 e.	15
Nashville, Tenn	24	15	19	18	n. 6 e.	9
Lexington, Ky.†	10	12	9	10	s. 27 w.	2
Louisville, Ky	25	18	15	14	n. 8 e.	7
Evansville, Ind.†	11	8	9	7	n. 34 e.	4
Indianapolis, Ind	22	15	17	19	n. 16 w.	7
Cincinnati, Ohio	20	12	17	27	n. 51 w.	13
Columbus, Ohio	18	17	12	25	n. 86 w.	13
Pittsburg, Pa	27	15	5	29	n. 63 w.	27
Parkersburg, W. Va	21	18	12	24	n. 76 w.	12
Elkins, W. Va	20	14	9	27	n. 72 w.	19
Lower Lake Region.						
Buffalo, N. Y	18	19	9	27	s. 87 w.	18
Canton, N. Y.†	11	5	8	15	n. 49 w.	9
Oswego, N. Y	24	16	10	22	n. 56 w.	14
Rochester, N. Y	22	14	11	32	n. 69 w.	22
Syracuse, N. Y	18	16	9	31	n. 85 w.	22
Erie, Pa	19	13	14	27	n. 65 w.	14
Cleveland, Ohio	19	22	15	17	s. 34 w.	4
Sandusky, Ohio†	9	8	7	13	n. 80 w.	6
Toledo, Ohio	21	16	10	28	n. 74 w.	19
Detroit, Mich	22	14	13	26	n. 58 w.	15
Upper Lake Region.						
Alpena, Mich	26	11	18	20	n. 8 w.	15
Escanaba, Mich	30	12	15	15	n.	18
Grand Haven, Mich	25	13	14	21	n. 30 w.	14
Grand Rapids, Mich	26	16	10	19	n. 42 w.	14
Houghton, Mich.†	14	4	13	9	n. 22 w.	11
Marquette, Mich	27	11	15	21	n. 21 w.	17
Port Huron, Mich	28	19	11	14	n. 18 w.	10
Sault Ste. Marie, Mich	27	8	20	21	n. 87 w.	19
Chicago, Ill	23	16	17	20	n. 23 w.	8
Milwaukee, Wis	23	14	16	18	n. 13 w.	9
Green Bay, Wis	26	17	18	14	n. 24 e.	10
Duluth, Minn	31	4	18	23	n. 10 w.	28
North Dakota.						
Moorhead, Minn	34	11	16	13	n. 7 e.	23
Bismarck, N. Dak	27	10	21	15	n. 19 e.	18
Devils Lake, N. Dak	28	13	18	18	n.	15
Williston, N. Dak	33	9	21	9	n. 27 e.	27
Upper Mississippi Valley.						
Minneapolis, Minn.*	13	6	6	12	n. 41 w.	9
St. Paul, Minn	33	15	14	14	n.	18
La Crosse, Wis.†	15	9	6	6	n.	6
Madison, Wis	24	18	14	17	n. 27 w.	7
Charles City, Iowa	32	14	12	19	n. 21 w.	19
Davenport, Iowa	25	14	18	19	n. 5 w.	11
Des Moines, Iowa	29	18	11	18	n. 32 w.	13
Dubuque, Iowa	27	14	15	17	n. 9 w.	13
Keokuk, Iowa	24	16	18	19	n. 7 w.	8
Cairo, Ill	25	18	20	12	n. 49 e.	11
La Salle, Ill.†	11	7	8	10	n. 27 w.	4
Peoria, Ill	23	20	14	12	n. 34 e.	4
Springfield, Ill	21	21	17	15	e.	2
Hannibal, Mo.†	11	7	6	12	n. 56 w.	7
St. Louis, Mo	22	17	21	13	n. 58 e.	9
Missouri Valley.						
Columbia, Mo.*	12	7	12	8	n. 39 e.	6
Kansas City, Mo	27	12	19	16	n. 11 e.	15
Springfield, Mo	25	17	23	10	n. 58 w.	15
Iola, Kans.†	11	7	11	6	n. 51 e.	6
Topeka, Kans.*	16	7	8	5	n. 18 e.	10
Lincoln, Nebr	31	17	13	9	n. 16 e.	15
Omaha, Nebr	30	17	13	14	n. 4 w.	13
Valentine, Nebr	28	11	14	17	n. 10 w.	17
Sioux City, Iowa †	13	7	12	7	n. 40 e.	8
Pierre, S. Dak	23	10	26	16	n. 38 e.	16
Huron, S. Dak	30	13	14	18	n. 13 w.	18
Yankton, S. Dak. †	11	6	11	10	n. 11 e.	5
Northern Slope.						
Havre, Mont	21	9	22	20	n. 9 e.	12
Miles City, Mont	30	15	16	12	n. 15 e.	16
Helena, Mont	15	13	3	39	n. 87 w.	36
Kalispell, Mont	8	16	6	35	s. 75 w.	30
Rapid City, S. Dak	23	10	14	22	n. 32 w.	15
Cheyenne, Wyo	27	14	11	22	n. 40 w.	17
Lander, Wyo	28	12	16	21	n. 17 w.	17
Yellowstone Park, Wyo	22	23	2	31	s. 88 w.	29
North Platte, Nebr	25	16	15	14	n. 6 e.	9
Middle Slope.						
Denver, Colo	28	19	17	10	n. 38 e.	11
Pueblo, Colo	18	12	25	16	n. 56 e.	11
Concordia, Kans	29	18	11	11	n.	11
Dodge, Kans	28	16	19	13	n. 37 e.	10
Wichita, Kans	28	17	20	10	n. 42 e.	15
Oklahoma, Okla	31	19	14	5	n. 37 e.	15
Southern Slope.						
Abilene, Tex	21	26	11	12	s. 11 w.	5
Amarillo, Tex	20	25	14	14	s.	5
Del Rio, Tex†	8	7	18	4	n. 86 e.	14
Roswell, N. Mex.	19	18	12	22	n. 84 w.	10
Southern Plateau.						
El Paso, Tex	18	4	13	35	n. 58 w.	26
Santa Fe, N. Mex	22	13	21	19	n. 13 e.	9
Flagstaff, Ariz	14	17	6	37	s. 84 w.	31
Phoenix. Ariz	13	10	25	22	n. 45 e.	4
Yuma, Ariz	12	19	6	38	s. 78 w.	33
Independence, Cal	30	19	7	17	n. 42 w.	15
Middle Plateau.						
Reno, Nev	5	11	10	41	s. 79 w.	32
Tonopah, Nev	17	10	11	32	n. 72 w.	22
Winnemucca, Nev	16	15	12	29	n. 87 w.	17
Modena, Utah	11	11	9	37	w.	28
Salt Lake City, Utah	21	21	15	18	w.	3
Durango, Colo	28	9	6	33	n. 55 w.	33
Grand Junction, Colo	18	14	14	28	n. 74 w.	15
Northern Plateau.						
Baker City, Oreg	21	26	9	15	s. 50 w.	8
Boise, Idaho	20	18	14	23	n. 77 w.	9
Lewiston, Idaho†	3	6	21	4	s. 80 e.	17
Pocatello, Idaho	7	23	11	29	s. 48 w.	24
Spokane, Wash	10	24	17	21	s. 16 w.	15
Walla Walla, Wash	13	31	15	14	s. 3 e.	18
North Pacific Coast Region.						
North Head, Wash	20	17	11	27	n. 79 w.	16
Port Crescent, Wash.*	12	5	7	15	n. 49 w.	11
Seattle, Wash	22	22	18	12	e.	6
Tacoma, Wash	23	21	5	23	n. 84 w.	18
Tatoosh Island, Wash	9	25	18	20	s. 7 w.	16
Portland, Oreg	21	21	9	21	w.	12
Roseburg, Oreg	26	14	13	21	n. 34 w.	14
Middle Pacific Coast Region.						
Eureka, Cal	31	14	11	18	n. 22 w.	18
Mount Tamalpais, Cal	21	7	1	44	n. 72 w.	45
Red Bluff, Cal	17	29	12	17	s. 23 w.	13
Sacramento, Cal	9	40	13	11	s. 87 e.	39
San Francisco, Cal	9	9	2	46	e.	44
San Jose, Cal.†	19	1	0	19	n. 47 w.	26
Southeast Farallon, Cal.*	......	......	......	......	......	......
South Pacific Coast Region.						
Fresno, Cal	45	1	7	23	n. 70 w.	47
Los Angeles, Cal	8	20	17	20	s. 14 w.	12
San Diego, Cal	18	10	8	34	n. 73 w.	27
San Luis Obispo, Cal	21	11	4	31	n. 70 w.	29
West Indies						
San Juan, Porto Rico	6	23	37	2	s. 64 e.	39
Grand Turk, W.I.†	3	11	18	5	s. 58 e.	15

* From observations at 8 p. m. only. † From observations at 8 a. m. only.

TABLE IV.—*Accumulated amounts of precipitation for each 5 minutes, for storms in which the rate of fall equaled or exceeded 0.25 in any 5 minutes, or 0.80 in 1 hour, during April, 1907, at all stations furnished with self-registering gages.*

Stations.	Date.	Total duration.		Total amount of precipitation.	Excessive rate.		Amount before excessive began.	Depths of precipitation (in inches) during periods of time indicated.													
		From—	To—		Began—	Ended—		5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
Abilene, Tex.	21			0.16														0.12			
Albany, N. Y.	8–9			0.77														0.20			
Alpena, Mich.	24–25			0.75														*			
Amarillo, Tex.	4			0.29														0.12			
Anniston, Ala.	16	5:40 a.m.	10:30 a.m.	0.98	5:59 a.m.	6:17 a.m.	0.02	0.13	0.28	0.47	0.51										
Do	28	2:42 p.m.	4:40 p.m.	0.72	3:00 p.m.	3:25 p.m.	0.02	0.22	0.39	0.45	0.50	0.56									
Asheville, N. C.	26–27	7:41 p.m.	7:30 a.m.	1.40	7:51 p.m.	8:31 p.m.	0.01	0.18	0.34	0.42	0.53	0.69	0.85	0.93	0.98						
Atlanta, Ga.	22–23			1.64														0.26			
Atlantic City, N. J.	26			0.15									0.15								
Augusta, Ga.	7–8	7:54 p.m.	D. N.	0.81	9:06 p.m.	9:16 p.m.	0.21	0.22	0.36												
Baltimore, Md.	26			0.77						0.30											
Bentonville, Ark.	29			0.84														0.59			
Binghamton, N. Y.	25–26			0.86														0.19			
Birmingham, Ala.	5	10:55 a.m.	3:50 p.m.	1.07	12:52 p.m.	1:27 p.m.	0.25	0.05	0.11	0.29	0.35	0.38	0.51	0.62	0.67						
Bismarck, N. Dak.	6			0.54														*			
Block Island, R. I.	9			0.76														0.26			
Boise, Idaho	13			0.26									0.14								
Boston, Mass.	8			1.13														0.29			
Buffalo, N. Y.	29–30			0.49														0.29			
Cairo, Ill.	29–30	8:00 p.m.	D. N.	1.79	9:31 p.m.	10:01 p.m.	0.16	0.09	0.26	0.35	0.50	0.82	0.94								
Canton, N. Y.	29–30			1.25																	
Charles City, Iowa	24			0.29														0.16			
Charleston, S. C.	7	5:25 p.m.	6:18 p.m.	1.01	5:33 p.m.	6:13 p.m.	0.01	0.08	0.12	0.12	0.13	0.15	0.32	0.67	0.99						
Charlotte, N. C.	18–19			0.55						0.16								0.33			
Chattanooga, Tenn.	5	8:15 p.m.	11:32 p.m.	0.67	9:35 p.m.	9:55 p.m.	0.07	0.11	0.27	0.35	0.46										
Cheyenne, Wyo.	28–29			0.41														*			
Chicago, Ill.	29–30			2.37														0.31			
Cincinnati, Ohio	25–26			1.36														0.44			
Cleveland, Ohio	30			0.37									0.15								
Columbia, Mo.	29–30			1.79														0.50			
Columbia, S. C.	22–23			1.72														0.31			
Columbus, Ohio	7	3:47 p.m.	5:30 p.m.	0.49	3:49 p.m.	4:00 p.m.	0.01	0.13	0.35												
Concord, N. H.	24			0.60														0.19			
Corpus Christi, Tex.	20–21			0.67														0.19			
Davenport, Iowa	29–30			0.82														0.17			
Del Rio, Tex.	29–30			0.04									0.02								
Denver, Colo.	19–20			1.44														*			
Des Moines, Iowa	29			0.64														*			
Detroit, Mich.	29–30			1.07									0.26								
Dodge, Kans.	29			0.15														*			
Dubuque, Iowa	28–29			0.85									0.19								
Duluth, Minn.	3–4			0.26														*			
Eastport, Me.	24			1.15														0.23			
Elkins, W. Va.	23–24			1.14														0.53			
Erie, Pa.	30–1[a]			0.73														0.40			
Escanaba, Mich.	27–28			0.45														*			
Evansville, Ind	15			0.68														0.47			
Fort Smith, Ark.	4–5			1.29														0.40			
Fort Worth, Tex.	29–30			0.57									0.21								
Galveston, Tex.	19	3:54 p.m.	4:40 p.m.	1.18	4:07 p.m.	4:34 p.m.	0.01	0.14	0.45	0.78	0.98	1.10	1.16								
Do	26	5:20 a.m.	8:15 a.m.	1.06	5:24 a.m.	5:44 a.m.	0.01	0.29	0.53	0.62	0.68										
Grand Haven, Mich.	28			0.56														0.45			
Grand Rapids, Mich	28–29			1.56									0.34								
Green Bay, Wis.	24			1.00														*			
Hannibal, Mo.	29–30			1.58														0.50			
Harrisburg, Pa.	23–24			0.70														0.21			
Hartford, Conn.	23–24			0.94									0.20								
Hatteras, N. C.	22–23			1.64														0.47			
Huron, S. Dak.	24			0.51														0.16			
Indianapolis, Ind.	7			0.53														0.19			
Iola, Kans.	29			1.50									0.31								
Jacksonville, Fla.	18	3:05 p.m.	5:20 p.m.	1.45	3:37 p.m.	3:55 p.m.	0.06	0.17	0.77	1.06	1.14										
Jupiter, Fla.	9			0.39						0.35											
Kansas City, Mo.	29–30			0.76														0.22			
Keokuk	29–30			0.76														0.26			
Key West, Fla.	13			0.10									0.10								
Knoxville, Tenn.	22–23			1.02									0.37								
La Crosse, Wis.	24			0.88														0.19			
La Salle, Ill.	29–30			1.00														0.21			
Lexington, Ky.	30			0.32														0.28			
Lincoln, Nebr.	18			0.32														*			
Little Rock, Ark.	15–16			1.99														0.93			
Los Angeles, Cal	2			0.10														0.07			
Louisville, Ky.	4			0.27									0.23								
Lynchburg, Va.	26–27	7:40 p.m.	4:30 a.m.	0.70	8:02 p.m.	8:13 p.m.	0.01	0.36	0.53	0.56											
Macon, Ga.	7	6:40 p.m.	D. N.	0.78	7:03 p.m.	7:22 p.m.	0.01	0.12	0.20	0.42	0.48										
Do	19	D. N.	D. N.	0.67	1:42 a.m.	1:57 a.m.	0.10	0.09	0.31	0.36											
Madison, Wis.	28			0.81									0.19								
Marquette, Mich.	8–9			0.88														*			
Memphis, Tenn.	29–30	9:20 p.m.	D. N.	1.40	10:04 p.m.	10:15 p.m.	0.10	0.30	0.40												
Meridian, Miss.	5	8:05 a.m.	12:15 p.m.	1.47	8:59 a.m.	9:43 a.m.	0.06	0.18	0.37	0.62	0.69	0.69	0.71	0.76	0.84	0.90					
Do	16–17	5:20 p.m.	5:30 a.m.	1.98	8:04 p.m.	8:33 p.m.	0.29	0.13	0.24	0.33	0.47	0.68	0.79	0.82	0.88						
Do	26	5:45 p.m.	6:30 p.m.	0.78	6:08 p.m.	6:21 p.m.	0.01	0.11	0.52	0.75											
Do	30–1[a]	3:02 p.m.	5:30 a.m.	1.88	3:55 p.m.	4:25 p.m.	0.07	0.11	0.17	0.29	0.51	0.91	1.12								
Milwaukee, Wis.	24			0.36														0.24			
Minneapolis, Minn.	27–28			1.17														*			
Mobile, Ala.	5	3:20 p.m.	5:35 p.m.	1.10	3:59 p.m.	4:19 p.m.	0.13	0.09	0.32	0.46	0.82										
Do	21–22	11:20 p.m.	11:30 a.m.	3.88	5:39 a.m.	6:29 a.m.	0.54	0.06	0.10	0.20	0.28	0.41	0.48	0.61	0.67	0.74	0.85				
					6:29 a.m.	7:19 a.m.		0.91	0.96	1.01	1.11	1.24	1.30	1.37	1.46	1.54	1.72				
					7:19 a.m.	8:22 a.m.		1.92	2.11	2.21	2.38	2.57	2.73	2.82	2.84	2.86	2.89	3.02			
Montgomery, Ala.	28	3:15 p.m.	5:40 p.m.	0.99	3:53 p.m.	5:02 p.m.	0.01	0.13	0.21	0.22	0.28	0.40	0.53	0.56	0.57	0.58	0.67	0.68	0.92		
Mount Weather, Va.	23–24			0.83									0.29								
Nantucket, Mass.	9			0.37														0.22			
Nashville, Tenn.	5	1:40 p.m.	4:30 p.m.	0.79	2:10 p.m.	2:24 p.m.	0.09	0.15	0.42	0.65											
New Haven, Conn.	8			1.16														0.29			
New Orleans, La.	25–26	8:23 a.m.	D. N.	8.76	12:27 p.m.	1:03 p.m.	0.86	0.07	0.15	0.42	0.66	1.00	1.38	1.54	1.62						
					2:03 p.m.	3:00 p.m.	2.63	0.09	0.13	0.25	0.27	0.38	0.42	0.49	0.67	0.76	0.85	0.97			
					4:28 p.m.	4:52 p.m.	4.07	0.07	0.19	0.53	0.90	1.06									
					5:58 p.m.	6:54 p.m.	5.43	0.10	0.17	0.37	0.53	0.55	0.60	0.68	0.76	0.92	1.17	1.31			
					8:16 p.m.	8:35 p.m.	6.85	0.17	0.40	0.51	0.55										
					9:56 p.m.	11:11 p.m.	7.69	0.10	0.35	0.42	0.46	0.50	0.55	0.57	0.57	0.59	0.67	0.84	1.00		

TABLE IV.—*Accumulated amounts of precipitation for each 5 minutes, etc.*—Continued.

Stations.	Date.	Total duration. From—	Total duration. To—	Total amount of precipitation.	Excessive rate. Began—	Excessive rate. Ended—	Amount before excessive began.	5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
New York, N. Y	7-8			0.90									0.25								
Norfolk, Va	27			0.34									0.31								
Northfield, Vt	25-26			1.59														0.16			
North Head, Wash	4-5			0.57									0.11								
Oklahoma, Okla	28	8:42 p.m.	9:35 p.m.	0.50	9:13 p.m.	9:27 p.m.	0.11	0.24	0.34	0.39											
Do	29	5:40 a.m.	2:15 p.m.	1.64	11:57 a.m.	12:32 p.m.	0.95	0.05	0.36	0.41	0.43	0.48	0.49	0.56							
Omaha, Nebr	17-18			0.60														0.13			
Palestine, Tex	4	4:35 p.m.	6:23 p.m.	1.35	5:18 p.m.	5:50 p.m.	0.12	0.35	0.65	0.88	0.93	1.08	1.17	1.21							
Parkersburg, W. Va	23			0.85														0.27			
Pensacola, Fla	22	7:45 a.m.	5:00 p.m.	1.86	9:54 a.m.	10:21 a.m.	0.29	0.20	0.43	0.55	0.59	0.77									
Peoria, Ill	29-30			1.39														0.49			
Philadelphia, Pa	23-24			0.93														0.17			
Pittsburg, Pa	23			0.53														0.18			
Portland, Me	24			0.44														0.15			
Portland, Oreg	5			1.02														0.23			
Pueblo, Colo	4			1.00														0.19			
Raleigh, N. C	19			0.68														0.53			
Richmond, Va	19			0.56														0.30			
Rochester, N. Y	30			0.30									0.13								
Sacramento, Cal	14-15			0.23														0.08			
St. Louis, Mo	22-23			1.54														0.57			
St. Paul, Minn	27-28			1.18														0.17			
Salt Lake City, Utah	3			0.21									0.16								
San Antonio, Tex	16-17	7:30 p.m.	7:30 a.m.	2.13	7:36 p.m.	8:04 p.m.	0.01	0.19	0.45	0.78	1.04	1.25									
San Diego, Cal	3			0.06									0.05								
Sandusky, Ohio	7			0.24									0.10								
San Francisco, Cal	4			0.08									0.05								
Savannah, Ga	7-8			0.48					0.30												
Scranton, Pa	23-24			0.24									0.09								
Seattle, Wash	9			0.51														0.30			
Shreveport, La	4-5	7:30 p.m.	D. N.	0.85	9:15 p.m.	9:30 p.m.	0.01	0.06	0.38	0.54											
Do	16	11:10 a.m.	12:55 p.m.	0.73	11:14 a.m.	11:55 a.m.	0.01	0.09	0.18	0.33	0.43	0.47	0.51	0.53	0.63						
Do	27-28	9:00 p.m.	1:40 a.m.	1.30	10:47 p.m.	11:19 p.m.	0.06	0.22	0.39	0.48	0.63	0.72	0.78								
Spokane, Wash	23			0.22														0.22			
Springfield, Ill	29	6:00 a.m.	4:30 p.m.	1.31	1:30 p.m.	1:58 p.m.	0.27	0.16	0.24	0.34	0.48	0.74	0.88								
Springfield, Mo	29			0.68														0.46			
Syracuse, N. Y	23-24			1.46														0.31			
Tampa, Fla	1	D. N.	7:45 a.m.	0.63	3:26 a.m.	3:36 a.m.	0.04	0.23	0.35												
Taylor, Tex	16	4:40 p.m.	9:45 p.m.	1.44	4:47 p.m.	5:12 p.m.	T.	0.07	0.27	0.76	1.06	1.16									
Do	25	6:50 p.m.	8:30 p.m.	1.26	7:02 p.m.	8:02 p.m.	T.	0.16	0.55	0.67	0.79	0.82	0.86	0.87	0.88	0.93	1.08	1.24			
Do	30	11:20 a.m.	3:00 p.m.	1.66	11:50 a.m.	12:10 p.m.	0.02	0.06	0.11	0.28	0.47										
					12:45 p.m.	1:20 p.m.	0.55	0.07	0.21	0.42	0.52	0.61	0.66	0.71							
Thomasville, Ga	6-7	5:55 p.m.	5:30 a.m.	0.86	2:38 a.m.	2:50 a.m.	0.23	0.12	0.31	0.35											
Do	18	11:30 a.m.	1:01 p.m.	0.78	12:25 p.m.	12:55 p.m.	0.32	0.22	0.41												
Toledo, Ohio	29-30			1.15														0.61			
Topeka, Kans	29			0.34														0.15			
Valentine, Nebr	10			0.33														0.16			
Vicksburg, Miss	27	10:00 p.m.	D. N.	1.44	10:26 p.m.	11:07 p.m.	0.04	0.06	0.10	0.15	0.33	0.44	0.77	1.13	1.36	1.40					
Do	30	9:20 a.m.	7:30 p.m.	2.22	10:51 a.m.	11:16 a.m.	0.04	0.10	0.12	0.19	0.40	0.47									
					4:09 p.m.	5:16 p.m.	0.97	0.06	0.24	0.39	0.43	0.49	0.51	0.52	0.53	0.53	0.55	0.91	1.13		
Washington, D. C	23			1.22														0.32			
Wichita, Kans	29			0.60														0.19			
Wilmington, N. C	22-23	6:55 a.m.	D. N.	2.17	12:14 a.m.	12:27 a.m.	1.48	0.14	0.37	0.45											
Wytheville, Va	8			0.66														0.41			
Yankton, S. Dak	27			0.35														•			
San Juan, Porto Rico	28-29			0.47									0.13								

• Self-register not working. a May 1.

TABLE V.—*Data furnished by the Canadian Meteorological Service, April, 1907.*

Stations.	Pressure, in inches. Actual, reduced to mean of 24 hours.	Pressure. Sea level, reduced to mean of 24 hours.	Pressure. Departure from normal.	Temperature. Mean.	Temperature. Departure from normal.	Temperature. Mean maximum.	Temperature. Mean minimum.	Precipitation. Total.	Precipitation. Departure from normal.	Precipitation. Total snowfall.
	Ins.	Ins.	Ins.	°	°	°	°	Ins.	Ins.	Ins.
St. Johns, N. F	29.62	29.76	—.13	33.2	— 1.3	39.1	27.3	5.86	+1.70	9.0
Sydney, C. B. I	29.79	29.83	—.06	34.4	— 0.6	43.2	25.6	3.52	—0.33	19.0
Halifax, N. S	29.70	29.81	—.15	38.3	+ 0.5	46.0	30.5	3.23	—0.95	5.2
Grand Manan, N. B	29.74	29.79	—.15	37.5	— 1.7	43.2	31.7	4.89	+1.98	15.4
Yarmouth, N. S	29.75	29.82	—.14	37.3	— 1.6	43.1	31.5	2.79	—0.60	6.4
Charlottetown, P. E. I	29.75	29.79	—.11	34.7	— 0.5	41.9	27.6	2.36	—0.29	14.2
Chatham, N. B	29.76	29.78	—.12	35.7	+ 0.2	45.8	25.7	4.32	+1.69	27.4
Father Point, Que	29.83	29.85	—.08	33.1	— 0.1	40.6	25.7	2.52	+0.94	12.8
Quebec, Que	29.53	29.86	—.13	34.8	— 0.3	42.7	26.9	3.18	+1.09	11.4
Montreal, Que	29.66	29.87	—.13	37.2	— 2.5	44.1	30.4	3.97	+1.73	17.8
Rockliffe, Ont	29.32	29.95	—.07	33.3	— 4.6	43.9	22.7	1.43	—0.13	10.1
Ottawa, Ont	29.54	29.86	—.16	36.5	— 3.5	44.7	28.3	2.85	+1.35	7.4
Kingston, Ont	29.60	29.92	—.10	36.8	— 3.2	43.6	29.9	1.87	+0.08	6.1
Toronto, Ont	29.54	29.93	—.09	38.4	— 2.4	45.9	30.8	2.09	—0.28	1.2
White River, Ont	28.63	29.99	—.05	21.2	—11.8	35.0	7.5	2.53	+1.28	25.6
Port Stanley, Ont	29.30	29.96	—.06	37.1	— 3.9	44.3	29.8	1.56	—0.91	0.5
Saugeen, Ont	29.23	29.96	—.07	34.4	— 4.3	41.5	27.3	2.64	+0.84	4.7

Stations.	Pressure, in inches. Actual, reduced to mean of 24 hours.	Pressure. Sea level, reduced to mean of 24 hours.	Pressure. Departure from normal.	Temperature. Mean.	Temperature. Departure from normal.	Temperature. Mean maximum.	Temperature. Mean minimum.	Precipitation. Total.	Precipitation. Departure from normal.	Precipitation. Total snowfall.
	Ins.	Ins.	Ins.	°	°	°	°	Ins.	Ins.	Ins.
Parry Sound, Ont	29.23	29.94	—.08	35.0	— 2.6	44.6	25.5	4.03	+2.12	19.0
Port Arthur, Ont	29.32	30.05	+.02	28.1	— 5.4	37.6	18.6	1.01	—0.71	10.1
Winnipeg, Man	29.24	30.11	+.09	28.2	— 7.7	36.7	19.8	0.99	—0.06	9.9
Minnedosa, Man	28.24	30.12	+.11	25.6	—10.4	35.9	15.4	1.07	+0.01	10.7
Qu'Appelle, Sask	27.76	30.07	+.08	25.8	—11.6	34.8	16.8	1.03	—0.02	10.2
Medicine Hat, Alberta	27.68	29.99	+.07	38.4	— 6.1	49.3	27.5	0.30	—0.44	3.0
Swift Current, Sask	27.44	30.07	+.11	31.0	—10.3	39.6	22.4	0.98	+0.05	9.4
Calgary, Alberta	26.42	30.01	+.11	34.6	— 5.0	45.4	23.8	1.79	+1.15	17.8
Banff, Alberta										
Edmonton, Alberta	27.68	30.00	+.11	32.9	— 7.0	43.2	22.6	0.49	—0.39	4.9
Prince Albert, Sask										
Battleford, Sask	28.28	30.07	+.11	27.2	—10.0	36.3	18.1	0.13	—0.34	1.3
Kamloops, B. C	28.74	29.96	+.03	48.4	— 0.5	61.7	35.1	0.16	—0.23	
Victoria, B. C	29.94	30.04	+.03	48.4	+ 1.6	57.2	39.6	1.39	—0.98	
Barkerville, B. C										
Hamilton, Bermuda	29.84	30.08	+.03	64.5	+ 0.6	69.1	60.0	4.84	+0.66	
Dawson, Yukon										

TABLE VI.—*Heights of rivers referred to zeros of gages, April, 1907.*

Stations.	Distance to mouth of river.	Flood stage on gage.	Highest water. Height.	Highest water. Date.	Lowest water. Height.	Lowest water. Date.	Mean stage.	Monthly range.
	Miles.	Feet.	Feet.		Feet.		Feet.	Feet.
Milk River.								
Havre, Mont.	237	9	10.0	5	4.4	28, 29	6.2	5.6
Yellowstone River.								
Billings, Mont.	330	8	1.7	18	0.8	1-4, 11	1.2	0.9
Cheyenne River.								
Rousseau, S. Dak.	7	12	2.1	25	0.7	20-23	1.3	1.4
James River.								
Lamoure, N. Dak.	330	14	4.6	1	− 0.6	25-30	0.6	5.2
Huron, S. Dak.	139	9	12.8	1	5.5	30	7.5	7.3
Big Blue River.								
Beatrice, Nebr.	92	14	2.8	9	2.3	1-6, 13-19, 27, 28	2.4	0.5
Blue Rapids, Kans.	47	14	3.9	5, 6	3.5	11-17, 22-27	3.6	0.4
Republican River.								
Clay Center, Kans.	42	18	6.1	1-4	5.7	24-26	5.9	0.4
Solomon River.								
Beloit, Kans.	75	16	1.9	6	0.4	1	0.8	1.5
Smoky Hill-Kansas River.								
Lindsborg, Kans.	341	20	1.9	2, 13	1.3	26	1.6	0.6
Abilene, Kans.	277	22	0.5	1, 4	0.0	25, 26	0.3	0.5
Manhattan, Kans.	116	18	3.5	1	3.1	26-29	3.3	0.4
Topeka, Kans.	87	21	6.7	1, 2, 9	6.1	26, 27	6.4	0.6
Osage River.								
Bagnell, Mo.	70	28	8.9	24	2.7	13-22	3.9	6.2
Gasconade River.								
Arlington, Mo.	98	16	1.2	1	0.2	20-22	0.6	1 0
Missouri River.								
Townsend, Mont.	2,504	11	5.6	18	4.3	1	4.9	1.3
Fort Benton, Mont.	2,285	12	3.3	21-23	2.3	1, 2	2.8	1.0
Wolfpoint, Mont.	1,952	17	10.1	4	3.3	23, 30	5.0	6.8
Bismarck, N. Dak.	1,309	14	11.0	11	4.5	24-27	5.7	6.5
Pierre, S. Dak.	1,114	14	7.2	12	4.1	7	5.1	3.1
Sioux City, Iowa	784	17	12.2	15	9.3	10, 11	10.2	2.9
Blair, Nebr.	705	15	10.8	16	8.0	30	9.1	2.8
Omaha, Nebr.	669	18	14.8	16	11.5	30	12.3	3.3
Plattsmouth, Nebr.	641	17	7.1	16	4.8	29	5.7	2.3
St. Joseph, Mo	481	10	7.1	17	4.4	28, 29	5.4	2.7
Kansas City, Mo.	388	21	15.1	18	11.7	29	12.9	3.4
Glasgow, Mo.	231	18	11.5	19	8.8	25, 30	9.8	2.7
Boonville, Mo.	199	20	13.8	19	11.3	29	12.2	2.5
Hermann, Mo.	103	24	12.4	1	10.0	17	11.3	2.4
Minnesota River.								
Mankato, Minn.	127	18	11.3	5	5.4	29, 30	7.7	5.9
St. Croix River.								
Stillwater, Minn.	23	11	13.7	6	8.6	30	11.4	5.1
Chippewa River.								
Chippewa Falls, Wis.	75	16	9.5	1	2.8	24	5.1	6.7
Red Cedar River.								
Cedar Rapids, Iowa	77	14	5.0	1-3	3.4	29	4.0	1.6
Des Moines River.								
Des Moines, Iowa	205	19	4.0	1, 2	2.7	28-30	3.4	1.3
Illinois River.								
La Salle, Ill.	197	18	20.4	1	15.3	28, 29	17.5	5.1
Peoria, Ill.	135	14	15.5	6	12.5	28, 29	14.1	3.0
Beardstown, Ill.	70	12	13.2	7-9	11.6	29	12.6	1.6
Clarion River.								
Clarion, Pa.	32	10	6.6	27	1.3	22, 23	2.7	5.3
Conemaugh River.								
Johnstown, Pa.	64	7	4.0	24	1.8	15	2.4	2.2
Allegheny River.								
Warren, Pa.	177	14	5.9	27	1.6	23	2.9	4.3
Franklin, Pa.	114	15	7.1	27	1.9	22	3.7	5.2
Parker, Pa.	73	20	7.8	27	2.0	23	3.7	5.8
Freeport, Pa.	29	20	11.7	27	4.6	23	6.8	7.1
Springdale, Pa.	17	27	16.0	27	9.1	23	11.3	6.9
Cheat River.								
Rowlesburg, W. Va.	36	14	7.0	24	1.8	7	3.1	5.2
Youghiogheny River.								
Confluence, Pa.	59	10	3.2	24	1.2	9	1.9	2.0
West Newton, Pa.	15	23	5.6	25	1.6	8	2.7	4.0
Monongahela River.								
Weston, W. Va.	161	18	3.1	24	− 0.8	4	0.3	3.9
Fairmont, W. Va.	119	25	18.9	25	14.6	5-7	15.9	4.3
Greensboro, Pa.	81	18	14.5	25	7.4	5-8	7.1	7.1
Lock No. 4, Pa.	40	28	17.5	25	6.9	4-8	9.4	10.6
Beaver River.								
Ellwood Junction, Pa.	10	14	5.4	27	1.9	18-23	2.9	3.5
Muskingum River.								
Zanesville, Ohio	70	25	19.8	27	9.3	21, 23	11.5	10.5
Beverly, Ohio	20	25	16.7	27, 28	7.3	22, 23	9.7	9.4
Little Kanawha River.								
Glenville, W. Va	77	20	7.0	24	− 0.6	5	1.9	7.6
Creston, W. Va.	38	20	8.9	24	3.5	4, 5, 30	4.7	5.4
New-Great Kanawha River.								
Radford, Va	218	14	4.2	9	0.7	20-22	1.7	3.5
Hinton, W. Va.	153	14	7.6	7	3.3	5, 23, 30	4.3	4.3
Charleston, W. Va.	58	30	13.8	8	6.4	23, 30	8.6	7.4
Scioto River.								
Columbus, Ohio	110	17	8.0	26	3.0	3-23	3.6	5.0
Licking River.								
Falmouth, Ky.	30	25	6.0	26	1.9	3, 4, 21, 22	2.9	4.1
Miami River.								
Dayton, Ohio	77	18	3.8	27	1.7	21-23	2.3	2.1
Kentucky River.								
Beattyville, Ky	254	30	6.0	10	0.5	29, 30	2.4	5.5
High Bridge, Ky.	117	17	14.0	7	10.0	1-3	11.4	4.0
Frankfort, Ky.	65	31	9.3	9, 10	6.4	1, 2	7.4	2.9
Wabash River.								
Terre Haute, Ind.	171	16	12.9	1, 2	2.9	26-29	5.0	10.0
Mount Carmel, Ill.	75	15	11.1	2, 3	4.9	23, 24	7.5	6.2
Cumberland River.								
Burnside, Ky.	518	50	32.6	7	2.6	2	7.4	30.0
Celina, Tenn.	383	45	27.3	9	4.4	1, 2	9.8	22.9
Carthage, Tenn.	308	40	22.9	10	4.0	2, 3	8.5	18.9

Stations.	Distance to mouth of river.	Flood stage on gage.	Highest water. Height.	Highest water. Date.	Lowest water. Height.	Lowest water. Date.	Mean stage.	Monthly range.
Cumberland River—Cont'd.	Miles.	Feet.	Feet.		Feet.		Feet.	Feet.
Nashville, Tenn.	193	40	25.8	11	9.6	3	13.4	16.2
Clarksville, Tenn.	126	43	30.5	12	7.0	4	13.4	23.5
Powell River.								
Tazewell, Tenn.	44	20	6.0	8	1.3	27	2.4	4.7
Clinch River.								
Speers Ferry, Va.	156	20	6.4	8	0.8	1	2.3	5.6
Clinton, Tenn	52	25	15.0	9	6.6	30	8.8	8.4
South Fork Holston River.								
Bluff City, Tenn.	35	15	3.4	9, 10	1.5	5	2.2	1.9
Holston River.								
Mendota, Va	165	8	6.0	7	1.8	3-5, 30	2.8	4.2
Rogersville, Tenn.	106	14	5.0	10	2.6	4, 5	3.5	2.4
French Broad River.								
Asheville, N. C.	144	6	1.6	27	− 0.2	5, 18, 22	0.2	1.8
Dandridge, Tenn.	46	12	3.0	24	1.5	4, 5, 16-18	2.0	1.5
Little Tennessee River.								
McGhee, Tenn.	17	20	6.0	24	3.7	5, 15	4.4	2.3
Hiwassee River.								
Charleston, Tenn	18	22	6.2	24	2.0	4	3.3	4.2
Tennessee River.								
Knoxville, Tenn.	635	12	5.3	9, 11, 25	2.5	5	3.9	2.8
Loudon, Tenn.	590	25	4.7	20, 24, 25, 28	2.8	5	3.8	1.9
Kingston, Tenn.	556	25	8.5	7	2.8	5	4.9	5.7
Chattanooga, Tenn.	452	33	11.2	8	5.6	1	7.8	5.6
Bridgeport, Ala	402	24	8.7	8	3.4	1	5.9	5.3
Guntersville, Ala.	349	31	13.8	10	6.2	1, 2	9.5	7.6
Florence, Ala.	255	16	7.7	10	3.4	3	5.4	4.3
Riverton, Ala.	225	26	11.5	11	5.8	2	8.7	5.7
Johnsonville, Tenn.	95	21	10.9	12	6.1	4, 5	8.4	4.8
Ohio River.								
Pittsburg, Pa.	966	22	10.8	27	3.5	9	5.8	7.3
Dam No. 2, Pa.	956	25	10.7	26	5.0	9	6.8	5.7
Beaver Dam, Pa.	925	27	17.4	27	8.2	8	10.5	9.2
Wheeling, W. Va.	875	36	18.3	27	8.0	7, 8, 11	10.5	10.3
Parkersburg, W. Va	785	36	20.8	28	8.8	15	11.8	12.0
Point Pleasant, W. Va.	703	39	23.8	29	11.9	6	16.1	11.9
Huntington, W. Va	660	50	27.6	29	16.7	24	20.6	10.9
Catlettsburg, Ky.	651	50	28.2	29	17.0	6	21.2	11.2
Portsmouth, Ohio	612	50	29.6	29	18.2	23	22.0	11.4
Maysville, Ky.	559	50	29.4	30	17.0	13	21.6	12.4
Cincinnati, Ohio	499	50	30.7	30	20.5	8	23.9	10.2
Madison, Ind	413	46	25.1	30	18.0	19	20.6	7.1
Louisville, Ky.	367	28	9.8	30	7.9	8	8.5	1.9
Evansville, Ind	184	35	31.1	1	15.7	21, 22	19.1	15.4
Mount Vernon, Ind.	148	35	34.5	1	15.0	23, 24	18.9	19.5
Paducah, Ky.	47	40	36.5	1	16.5	23-25	21.0	20.0
Cairo, Ill.	1	45	42.8	1	27.8	22, 23, 25	30.8	15.0
St. Francis River.								
Marked Tree, Ark.	104	17	15.3	1, 2	13.4	30	14.5	1.9
Neosho River.								
Neosho Rapids, Kans.	326	22	1.8	1	1.4	26-29	1.6	0.4
Iola, Kans.	262	10	1.9	30	0.4	29	0.6	1.5
Oswego, Kans. (a)	184	20	8.1	30	0.6	19-29	1.2	7.5
Fort Gibson, Ind. T.	3	22	12.4	30	9.2	1, 2	10.5	3.2
Canadian River.								
Calvin, Ind. T.	99	10	3.8	6	2.0	22	2.5	1.8
Black River.								
Blackrock, Ark.	67	12	10.8	1	5.8	26-29	8.0	5.0
White River.								
Calicorock, Ark	272	15	10.0	30	2.8	2-4	5.2	7.2
Batesville, Ark.	217	18	14.1	30	4.7	3	7.4	9.4
Newport, Ark.	185	26	19.1	9	7.6	24	12.0	11.5
Clarendon, Ark.	75	30	25.5	1	22.8	29	24.4	2.7
Arkansas River.								
Wichita, Kans.	832	10	− 0.5	1, 2	− 1.0	27-30	− 0.8	0.5
Tulsa, Ind. T.	551	16	7.5	30	2.9	22	3.3	4.6
Webbers Falls, Ind. T.	465	23	7.4	30	4.5	21-26	5.6	2.9
Fort Smith, Ark.	403	22	9.5	8	4.4	22, 27	5.8	5.1
Dardanelle, Ark.	256	21	9.5	9	3.8	22, 23	5.6	5.7
Little Rock, Ark.	176	23	10.4	11	5.2	3, 4	6.6	5.2
Pine Bluff, Ark.	121	23	12.8	12	7.6	4, 7	9.2	5.2
Yazoo River.								
Greenwood, Miss	175	38	28.7	1	14.7	30	22.0	14.0
Yazoo City, Miss.	80	25	23.4	10-13	17.4	30	22.0	6.0
Ouachita River.								
Camden, Ark.	304	39	20.0	30	6.7	17	11.8	13.3
Monroe, La	122	40	35.4	6	25.2	27	29.3	10.2
Red River								
Denison, Tex.	768	22	2.1	7-9	1.0	25-29	1.4	1.1
Arthur City, Tex.	688	27	10.6	8	6.7	26, 27	7.8	3.9
Fulton, Ark.	515	28	17.4	30	8.5	22	11.1	8.9
Shreveport, La.	327	29	7.7	12	2.9	21	5.1	4.8
Alexandria, La.	118	33	13.4	1	9.0	24, 25	10.9	4.4
Mississippi River.								
Fort Ripley, Minn.	2,082	10	9.8	1	7.1	29, 30	8.3	2.7
St. Paul, Minn.	1,954	14	13.3	4	7.3	30	10.4	6.0
Red Wing, Minn.	1,914	14	10.8	6	6.4	30	8.7	4.4
Reeds Landing, Minn.	1,884	12	10.0	3, 4	6.0	30	8.2	4.0
La Crosse, Wis.	1,819	12	10.7	1	7.4	30	9.8	3.3
Prairie du Chien, Wis.	1,759	18	15.0	8	9.1	30	12.3	5.9
Dubuque, Iowa	1,699	18	16.1	9, 10	10.1	1	13.2	6.0
Clinton, Iowa	1,629	16	14.8	11-13	8.8	1	12.2	6.0
Leclaire, Iowa	1,609	10	10.5	11-13	6.2	1	8.4	4.3
Davenport, Iowa	1,593	15	13.6	12, 13	8.2	1	11.0	5.4
Muscatine, Iowa	1,562	16	14.5	13, 14	9.7	1	12.3	4.8
Galland, Iowa	1,472	8	7.4	16	4.6	2, 3	6.1	2.8
Keokuk, Iowa	1,463	15	12.9	16	8.1	1	10.6	4.8
Warsaw, Ill.	1,458	18	15.5	16, 17	11.0	1	13.4	4.5
Hannibal, Mo	1,402	13	13.6	17-19	9.1	1, 2	11.5	4.5
Grafton, Ill	1,306	23	15.6	24	11.9	1	13.9	2.7
St. Louis, Mo	1,264	30	20.4	24, 25	16.5	8	18.2	3.9
Chester, Ill	1,189	30	17.2	25	13.6	9	15.3	3.6

TABLE VI.—*Heights of rivers referred to zeros of gages*—Continued.

Stations.	Distance to mouth of river.	Flood stage on gage.	Highest water. Height.	Highest water. Date.	Lowest water. Height.	Lowest water. Date.	Mean stage.	Monthly range.
	Miles.	Feet.	Feet.		Feet.		Feet.	Feet.
Mississippi River—Cont'd.								
Cape Girardeau, Mo	1,128	28	21.9	26	18.5	10	20.0	3.4
New Madrid, Mo	1,003	34	34.7	1	22.9	22-26, 29	25.5	11.8
Luxora, Ark	905	33	30.0	1	16.0	26, 27	20.3	14.0
Memphis, Tenn	843	33	35.5	1-3	21.1	27-29	26.0	14.4
Helena, Ark	767	42	45.3	3, 4	28.1	28, 29	35.6	17.2
Arkansas City, Ark	635	42	47.4	6, 7	33.4	30	41.7	14.0
Greenville, Miss	595	42	41.8	6-8	28.0	30	36.2	13.8
Vicksburg, Miss	474	45	45.3	9, 10	34.4	30	42.0	10.9
Natchez, Miss	373	46	45.2	12	36.8	30	42.9	8.4
Baton Rouge, La	240	35	33.6	13-15	28.7	30	32.3	4.9
Donaldsonville, La	188	28	26.6	14, 15	22.4	30	25.5	4.2
New Orleans, La	108	16	17.3	13	14.6	30	16.6	2.7
Atchafalaya River.								
Simmesport, La	127	33	37.8	14-17	33.3	30	36.7	4.5
Melville, La	103	31	34.8	14-17	32.3	30	34.2	2.5
Morgan City, La	19	8	5.0	29, 30	2.8	1	4.2	2.2
Grand River.								
Eaton Rapids, Mich	166	6	4.2	1	3.6	{ 22-25 27-29 }	3.8	0.6
Lansing, Mich	140	11	6.7	1	2.4	24	4.0	4.3
Grand Ledge, Mich. (7)	129	6	5.5	1	2.6	26-29	......	2.9
Portland, Mich	103	12	6.3	1	3.0	25-28	3.9	3.3
Ionia, Mich	81	24	17.0	1	8.3	28	11.1	8.7
Grand Rapids, Mich	38	11	7.8	1, 2	2.2	27-29	3.6	5.6
Sandusky River.								
Tiffin, Ohio	65	7	2.1	1, 28	0.9	26	1.4	1.2
Penobscot River.								
Mattawamkeag, Me. (13)	87	......	20.6	30	13.9	19	16.1	6.7
West Enfield, Me	60	......	15.6	30	6.8	1	9.0	8.8
Kennebec River.								
Winslow, Me	46	8	8.9	25	4.0	22	5.8	4.9
Merrimac River.								
Franklin Junction, N. H	110	13	11.4	25	5.3	21	6.9	6.1
Concord, N. H	94	10	4.7	1	1.6	23	2.7	3.1
Manchester, N. H	68	8	4.8	25, 28	1.9	10	3.0	2.9
Connecticut River.								
Wells River, Vt	255	34	31.0	27, 28	25.0	14, 15	27.2	6.0
Whiteriver Junction, Vt	209	......	19.2	27	8.0	22	11.2	11.2
Bellows Falls, Vt	170	12	8.5	28	2.4	23	4.4	6.1
Holyoke, Mass	84	9	7.7	28	2.3	23	4.2	5.4
Hartford, Conn	50	16	16.0	1	6.5	23, 24	10.2	9.5
Housatonic River.								
Gaylordsville, Conn	44	15	5.8	1	4.9	23	5.2	0.9
Mohawk River.								
Utica, N. Y	98	6	9.0	27	1.8	21-24	3.8	7.2
Tribeshill, N. Y	42	12	6.0	27	1.2	22	2.7	4.8
Schenectady, N. Y	19	15	8.5	27	2.0	20-22	4.0	6.5
Hudson River.								
Troy, N. Y	154	14	15.0	2	6.2	20	8.8	8.8
Albany, N. Y	147	12	10.5	1	2.1	22	5.7	8.4
Pompton River.								
Pompton Plains, N. J	6	8	4.9	10-15	4.4	22-26	4.7	0.5
Passaic River.								
Chatham, N. J	69	7	4.0	10	2.4	22, 23	2.9	1.6
Lehigh River.								
Mauch Chunk, Pa. (14)	45	15	4.9	25, 28	4.2	5, 6	4.5	0.7
Schuylkill River.								
Reading, Pa	66	12	1.0	1	0.5	23, 28-30	0.7	0.5
Delaware River.								
Hancock (E. Branch), N. Y	287	12	5.1	1	3.7	22, 23	4.2	1.4
Hancock (W. Branch), N. Y	287	10	5.3	27	3.8	22	4.3	1.5
Port Jervis, N. Y	215	14	3.6	1	1.5	23	2.3	2.1
Phillipsburg, N. J. (7)	146	26	5.8	1	2.9	23	3.7	2.9
Trenton, N. J	92	18	3.6	1, 2	2.2	23	2.9	1.4
North Branch Susquehanna.								
Binghamton, N. Y	183	16	8.0	28	3.0	23	4.2	5.0
Towanda, Pa	139	16	9.4	27	2.3	23	3.8	7.1
Wilkes-Barre, Pa	60	17	14.6	28	5.3	24	7.4	9.3
West Branch Susquehanna.								
Clearfield, Pa	165	8	2.2	25	1.4	7-14, 16-23	1.6	0.8
Renovo, Pa. (13)	90	16	6.5	27	1.9	22, 23	2.8	4.6
Williamsport, Pa	39	20	7.5	28	2.4	23	3.8	5.1
Juniata River.								
Huntingdon, Pa	90	24	5.3	24	3.9	23	4.2	1.4
Susquehanna River.								
Selinsgrove, Pa	116	17	6.4	28, 29	2.1	24	3.3	4.3
Harrisburg, Pa	69	17	7.2	29	3.0	24	4.1	4.2
Shenandoah River.								
Riverton, Va	58	22	9.0	10	......	......	......	......
Potomac River.								
Cumberland, Md	290	8	4.5	1-4, 24-26	3.8	14-18	4.1	0.7
Harpers Ferry, W. Va	172	18	10.5	10	2.0	6	4.4	8.5
James River.								
Buchanan, Va	305	12	8.8	9	3.7	23	5.1	5.1
Lynchburg, Va	260	18	8.6	10	2.0	1	3.5	6.6
Columbia, Va	167	18	18.0	11	5.4	2	8.2	12.6
Richmond, Va	111	12	8.9	10	0.7	21	2.1	8.2
Dan River.								
Danville, Va	55	8	2.6	7	0.0	18-22	0.6	2.6
Staunton River.								
Randolph, Va	26	28	14.5	8	5.1	6	8.2	9.4
Roanoke River.								
Clarksville, Va	196	12	6.4	8	0.9	22	2.2	5.5
Weldon, N. C	129	30	26.6	9	11.1	1, 22	14.8	15.1
Tar River.								
Tarboro, N. C	46	25	14.2	27	2.2	18	8.2	12.0
Greenville, N. C	21	22	12.2	28	5.9	1	8.9	6.3
Haw River.								
Moncure, N. C	171	25	17.1	24	8.5	15, 17	9.9	8.6
Cape Fear River.								
Fayetteville, N. C	112	38	26.0	25	5.2	18, 19	10.5	20.8
Waccamaw River.								
Conway, S. C	40	7	5.1	27, 28	2.2	10, 17	3.2	2.9

Stations.	Distance to mouth of river.	Flood stage on gage.	Highest water. Height.	Highest water. Date.	Lowest water. Height.	Lowest water. Date.	Mean stage.	Monthly range.
	Miles.	Feet.	Feet.		Feet.		Feet.	Feet.
Pedee River.								
Cheraw, S. C	149	27	20.1	25	2.4	18	6.1	17.7
Smiths Mills, S. C	51	16	12.0	30	5.0	1	8.2	7.0
Lynch Creek.								
Effingham, S. C	35	12	7.5	30	2.8	1, 15, 16	4.7	4.7
Black River.								
Kingstree, S. C	45	12	7.4	29, 30	4.0	1, 4-7, 22	4.8	3.4
Catawba-Wateree River.								
Mount Holly, N. C	143	15	2.6	23	1.8	5, 6, 11-22	1.9	0.8
Catawba, S. C	107	11	5.8	24	1.8	21	2.7	4.0
Camden, S. C	37	24	18.2	24	4.9	1	7.6	13.3
Broad River.								
Blairs, S. C	36	14	7.5	24	0.2	12, 17	1.5	7.3
Saluda River.								
Pelzer, S. C	109	7	5.2	24	2.9	12	3.8	2.3
Chappels, S. C	56	14	12.0	24	1.6	6, 7, 17, 18	3.0	10.4
Congaree River.								
Columbia, S. C	52	15	8.7	24	1.0	17	2.2	7.7
Santee River.								
Rimini, S. C	108	10	13.2	28	6.0	16-18	8.4	7.2
St. Stephens, S. C	50	12	8.6	30	3.5	18	5.6	5.1
Edisto River.								
Edisto, S. C	75	6	5.0	27	2.2	2	3.6	2.8
Broad River.								
Carlton, Ga	30	11	7.6	24	2.5	{ 2-6, 15-17, 20 }	3.0	5.1
Savannah River.								
Calhoun Falls, S. C	347	15	8.5	23	2.2	8	3.6	6.3
Augusta, Ga	268	32	19.5	24	7.7	17	9.5	11.8
Oconee River.								
Milledgeville, Ga	147	25	10.4	24	3.0	16	4.5	7.4
Dublin, Ga	79	30	10.7	27	0.7	1	3.5	10.0
Ocmulgee River.								
Macon, Ga	203	18	12.2	23	2.6	15, 16	5.1	9.6
Abbeville, Ga	96	11	10.3	30	3.4	18	6.0	6.9
Flint River.								
Woodbury, Ga	227	10	4.3	30	0.6	14-16	17.8	3.7
Montezuma, Ga	152	20	11.7	26	3.6	1	6.6	8.1
Albany, Ga	90	20	10.4	27	1.6	1	5.2	8.8
Bainbridge, Ga	29	22	11.1	29, 30	3.2	6	6.3	7.9
Chattahoochee River.								
Oakdale, Ga	305	18	6.0	25	3.0	2-4	4.2	3.0
West Point, Ga	239	20	8.2	24	3.3	14, 16	4.6	4.9
Eufaula, Ala	90	40	20.0	24	4.5	5, 15, 16	8.9	15.5
Alaga, Ala	30	25	20.6	25	5.3	2-5, 17	9.4	15.3
Coosa River.								
Rome, Ga	266	30	8.6	24	2.9	5	3.8	5.7
Gadsden, Ala	162	22	8.6	25	3.5	1	4.8	5.1
Lock No. 4, Ala	113	17	6.9	25, 26	2.8	1	3.9	4.1
Wetumpka, Ala	12	45	19.8	24	6.7	15	10.9	13.1
Tallapoosa River.								
Milstead, Ala	42	35	21.1	23	2.9	17	6.9	18.2
Alabama River.								
Montgomery, Ala	323	35	18.1	24	4.5	16	8.7	13.6
Selma, Ala	246	35	23.9	26	5.6	16	10.9	18.3
Black Warrior River.								
Tuscaloosa, Ala	90	43	17.0	24	6.9	5	11.2	10.1
Tombigbee River.								
Columbus, Miss	316	33	3.9	20	— 1.0	16	1.1	4.9
Vienna, Ala	246	42	7.6	23	1.0	5	4.2	6.6
Demopolis, Ala. (a)	168	35	24.3	24	3.9	5	11.6	20.4
Leaf River.								
Hattiesburg, Miss	60	20	12.3	23	2.8	4-6	5.5	9.5
Chickasawhay River.								
Enterprise, Miss	144	18	10.0	23	1.9	16	4.4	8.1
Shubuta, Miss	166	25	18.8	24	4.4	2-5	9.6	14.4
Pascagoula River.								
Merrill, Miss	78	20	18.3	26	3.5	17	9.0	14.8
Pearl River.								
Jackson, Miss	242	20	8.6	25	3.0	4	5.3	5.6
Columbia, Miss	110	14	12.0	24	4.8	15-18	6.7	7.2
Sabine River.								
Logansport, La	315	25	16.3	26	4.0	16	8.7	12.3
Neches River.								
Rockland, Tex	105	20	5.3	7	2.1	20	2.9	3.2
Beaumont, Tex	18	10	1.9	27, 30	1.0	14, 21	1.5	0.9
Trinity River.								
Dallas, Tex	320	25	17.0	30	3.3	17-19	4.6	13.7
Long Lake, Tex	211	35	5.3	5	3.2	20	4.5	2.1
Riverside, Tex	112	40	4.6	28	2.0	12, 16, 17	3.0	2.6
Liberty, Tex	20	25	7.5	30	4.8	20	5.8	2.7
Brazos River.								
Kopperl, Tex	345	21	0.8	30	0.0	16-21, 29	0.2	0.8
Waco, Tex	285	24	3.8	2	2.5	26-30	2.9	1.3
Valley Junction, Tex	215	40	4.5	22	2.0	14, 15, 29, 30	2.6	2.5
Hempstead, Tex	140	40	2.0	25	— 3.4	19, 20	—1.4	5.4
Booth, Tex	61	39	2.8	1-13	2.2	14-18	2.5	0.6
Colorado River.								
Ballinger, Tex	489	21	0.7	1-15	0.5	29, 30	0.6	0.2
Austin, Tex	214	18	2.0	1	0.7	29, 30	1.1	1.3
Columbus, Tex	98	24	7.4	22	6.0	12-16, 19, 20	6.4	1.4
Guadalupe River.								
Gonzales, Tex	112	22	11.2	27	0.2	14-16	0.8	11.0
Victoria, Tex	85	16	10.5	29	0.9	13	1.8	9.6
Rio Grande River.								
San Marcial, N. Mex	1233	14	10.7	16, 18	8.8	3-5, 9, 10	9.6	1.9
El Paso, Tex	1030	14	11.6	20	9.1	9, 15	10.0	2.5
Red River of the North.								
Moorhead, Minn	284	26	29.3	1	12.1	30	16.8	17.2
Kootenai River.								
Bonners Ferry, Idaho	123	24	8.5	25	— 0.1	1	5.2	8.6
Pend D'oreille River.								
Newport, Wash	86	14	6.6	27	2.2	2, 3	4.4	4.4

TABLE VI.—*Heights of rivers referred to zeros of gages*—Continued.

Stations.	Distance to mouth of river.	Flood stage on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
	Miles.	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Snake River.								
Lewiston, Idaho	144	24	13.8	17	7.6	1	10.5	6.2
Columbia River.								
Wenatchee, Wash	473	40	14.2	30	7.9	1	10.3	6.3
Umatilla, Oreg	270	25	11.6	18, 19	6.0	1, 2	9.3	5.6
The Dalles, Oreg	166	40	18.4	15	9.1	2	14.7	9.3
Willamette River.								
Albany, Oreg	118	20	20.0	9	4.2	30	8.1	15.8
Salem, Oreg	84	20	17.7	8	3.3	30	7.4	14.4
Portland, Oreg	12	15	14.7	11	6.5	5	10.6	8.2
Sacramento River.								
Kennett, Cal	323	23	11.8	6	5.0	30	8.1	6.8
Red Bluff, Cal	265	23	14.0	7	6.5	30	10.1	7.5
Colusa, Cal	156	25	22.0	8	16.2	29	19.8	5.8
Knights Landing, Cal	99	......	17.2	18, 19	15.9	30	16.7	1.3
Sacramento, Cal	64	25	22.3	1	20.3	30	21.0	2.0
San Joaquin River.								
Pollasky, Cal	203	10	6.0	13	2.8	4, 6, 7	4.6	3.2
Firebaugh, Cal	148	......	11.4	29, 30	8.1	8, 9	10.1	3.3
Lathrop, Cal	49	12	16.5	1	15.5	10, 11	16.0	1.0

Figures indicate number of days frozen. (ᵃ) One day missing. (ʸ) Eighteen days only.

Honolulu, T. H., latitude 21° 19′ north, longitude 157° 30′ west; barometer above sea, 38 feet; gravity correction, —0.057 **inch, applied.** *April, 1907.*

Day.	Pressure.*		Air temperature.				Moisture.				Wind.				Precipitation.		Clouds.					
							8 a. m.		8 p. m.		8 a. m.		8 p. m.				8 a. m.			8 p. m.		
	8 a. m.	8 p. m.	8 a. m.	8 p. m.	Maximum.	Minimum.	Wet.	Relative humidity.	Wet.	Relative humidity.	Direction.	Velocity.	Direction.	Velocity.	8 a. m.	8 p. m.	Amount.	Kind.	Direction.	Amount.	Kind.	Direction.
1	30.14	30.09	73.0	72.0	76	67	64.0	61	64.0	65	e.	4	e.	20	0.02	T.	7	Cu.	e.	2 1	A.-s. Cu.	nw. e.
2	30.11	30.10	74.0	70.5	78	67	62.3	51	65.0	74	ne.	17	ne.	12	0.00	0.15	3	Cu.	e.	10	N.	ne.
3	30.13	30.11	73.4	72.0	78	68	64.0	60	65.0	69	e.	7	e.	12	0.03	0.00	4	S.-cu.	e.	3	S.	e.
4	30.16	30.14	74.0	71.5	78	70	64.0	58	65.0	70	ne.	18	ne.	26	0.00	0.00	4	Cu.	e.	few.	Cu.	e.
5	30.18	30.11	74.0	72.0	79	66	65.0	61	65.0	69	ne.	9	e.	7	T.	0.00	1 3	A.-cu. Cu.	0 e.	0	0	0
6	30.11	30.03	74.5	71.0	79	66	67.0	68	65.0	72	ne.	3	ne.	5	0.00	0.00	2	A.-cu.	0	0	0	0
7	30.04	30.05	72.0	67.0	75	66	65.0	69	57.5	56	w.	4	n.	18	0.00	0.02	2	Ci.-cu.	w.	few.	Cu.	n.
8	30.11	30.10	68.0	67.0	72	64	58.0	54	57.0	53	ne.	17	ne.	17	0.00	0.00	4	Cu.	e.	0	0	0
9	30.16	30.12	68.4	68.0	74	63	58.0	53	60.0	62	ne.	10	e.	12	0.00	T.	7	Cu.	e.	9	N.	e.
10	30.16	30.09	68.5	69.0	74	63	60.0	60	61.0	63	ne.	10	ne.	9	0.05	0.00	6	Cu.	e.	7	Cu.	e.
11	30.12	30.09	66.5	69.5	75	64	61.0	73	63.0	70	ne.	10	ne.	5	0.01	T.	9	S.-cu.	e.	9	S.	e.
12	30.11	30.06	70.0	70.0	76	65	63.0	68	63.0	68	ne.	18	ne.	16	T.	0.00	7 1	S.-cu. Cu.	e. e.	0	0	0
13	30.09	30.04	71.0	70.0	78	66	61.5	58	62.5	66	e.	7	e.	5	T.	0.00	9	S.-cu.	e.	0	0	0
14	30.04	29.99	74.0	72.0	80	66	65.0	61	66.0	73	ne.	2	se.	3	0.00	0.00	1 1	A.-s. Cu.	w. e.	0	0	0
15	30.02	30.03	75.0	73.0	79	68	69.0	74	69.0	82	e.	8	e.	3	0.00	0.00	1 3	A.-s. A.-cu.	0 se.	few.	Cu.	e.
16	30.05	30.05	73.2	73.0	80	69	67.5	74	67.0	73	sw.	4	e.	7	0.13	0.00	2 2	A.-cu. Cu.	s. e.	few.	Cu.	se.
17	30.07	30.03	74.0	73.5	81	69	65.4	63	68.0	76	sw.	5	ne.	2	0.00	0.00	5	Ci.	0	6	Cu.	se.
18	30.02	29.98	74.0	72.0	77	68	66.3	66	67.0	77	nw.	5	n.	5	0.00	0.02	few.	Cu.	0	8	Cu.	n.
19	30.02	30.00	71.0	69.0	74	67	65.0	72	62.0	67	n.	14	ne.	15	0.04	0.00	4	Cu.	n.	0	0	0
20	30.04	29.99	70.0	68.0	75	67	60.0	55	59.0	58	ne.	19	ne.	14	0.00	0.00	2	Cu.	e.	0	0	0
21	30.02	29.98	69.7	68.0	76	65	57.5	47	60.0	62	ne.	17	ne.	4	0.00	0.00	4	A.-cu.	ne.	3	Cu.	ne.
22	30.00	29.98	71.3	69.0	75	64	61.5	57	62.0	67	e.	3	ne.	10	0.00	0.00	4	A.-cu.	ne.	2	Cu.	ne.
23	30.05	30.07	72.0	69.5	77	63	62.5	59	62.0	66	sw.	3	ne.	7	0.00	0.00	6	S.-cu.	ne.	2	Cu.	ne.
24	30.07	30.06	71.0	69.5	76	65	63.2	65	62.0	66	ne.	8	ne.	17	0.00	0.00	6	Cu.	ne.	few.	Cu.	ne.
25	30.06	30.05	72.5	70.0	77	67	65.0	67	65.0	77	ne.	10	ne.	4	0.00	T.	1	Cu.	ne.	7	N.	ne.
26	30.04	30.02	69.0	70.0	78	68	65.5	83	64.0	72	ne.	8	ne.	12	T.	0.04	10	N.	ne.	6 3	A.-cu. Cu.	n. ne.
27	30.03	30.01	72.2	72.0	81	67	66.0	72	66.0	73	ne.	4	ne.	2	0.00	0.00	few.	Cu.	ne.	8	Cu.	ne.
28	30.03	30.02	76.0	70.0	80	66	67.0	62	67.0	86	ne.	1	n.	2	0.00	0.13	1 1	A.-s. Cu.	0 e.	9	S.	ne.
29	30.03	30.01	75.0	71.5	78	66	67.0	66	66.0	75	n.	1	e.	9	0.00	0.00	6 1	A.-s. Cu.	n. e.	4	S	ne.
30	30.03	30.00	74.0	72.0	80	70	66.0	65	66.0	73	w.	5	ne.	15	T.	0.00	8 1	A.-s. Cu.	w. 0	0	0	0
31	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Mean	30.075	30.047	72.0	70.4	77.2	66.3	63.7	63.4	63.7	69.3	ne.	8.4	ne.	9.8	0.28	0.36	4.6	Cu.	e.	3.3	Cu.	ne.

Observations are made at 8 a. m. and 8 p. m., local standard time, which is that of 157° 30′ west, and is 5ʰ and 30ᵐ slower than 75th meridian time. * Pressure values are reduced to sea level and standard gravity.

RAINFALL IN JAMAICA.

Thru the kindness of Dr. H. H. Cousins, chemist to the government of Jamaica and now in charge of the meteorological service of that island, we have received the following table:

Comparative table of rainfall.

[Based upon the average stations only.]

APRIL, 1907.

Divisions.	Relative area.	Number of stations.	Rainfall.	
			1907.	Average.
	Per cent.		*Inches.*	*Inches.*
Northeastern division	25	21	0.86	6.05
Northern division	22	45	0.62	3.29
West-central division	26	23	2.43	7.32
Southern division	27	28	1.07	4.46
Means	100	....	1.25	5.28

The rainfall for April was therefore less than one-fourth the average for the whole island. The greatest fall, 5.93 inches, occurred at Marshall's Pen, in the west-central division, while no rain fell at Johnson River Bridge, in the northeastern division; Southfield, in the northern division, and at Easington and five other stations, in the southern division.

Chart I. Hydrographs for Seven Principal Rivers of the United States, April, 1907.

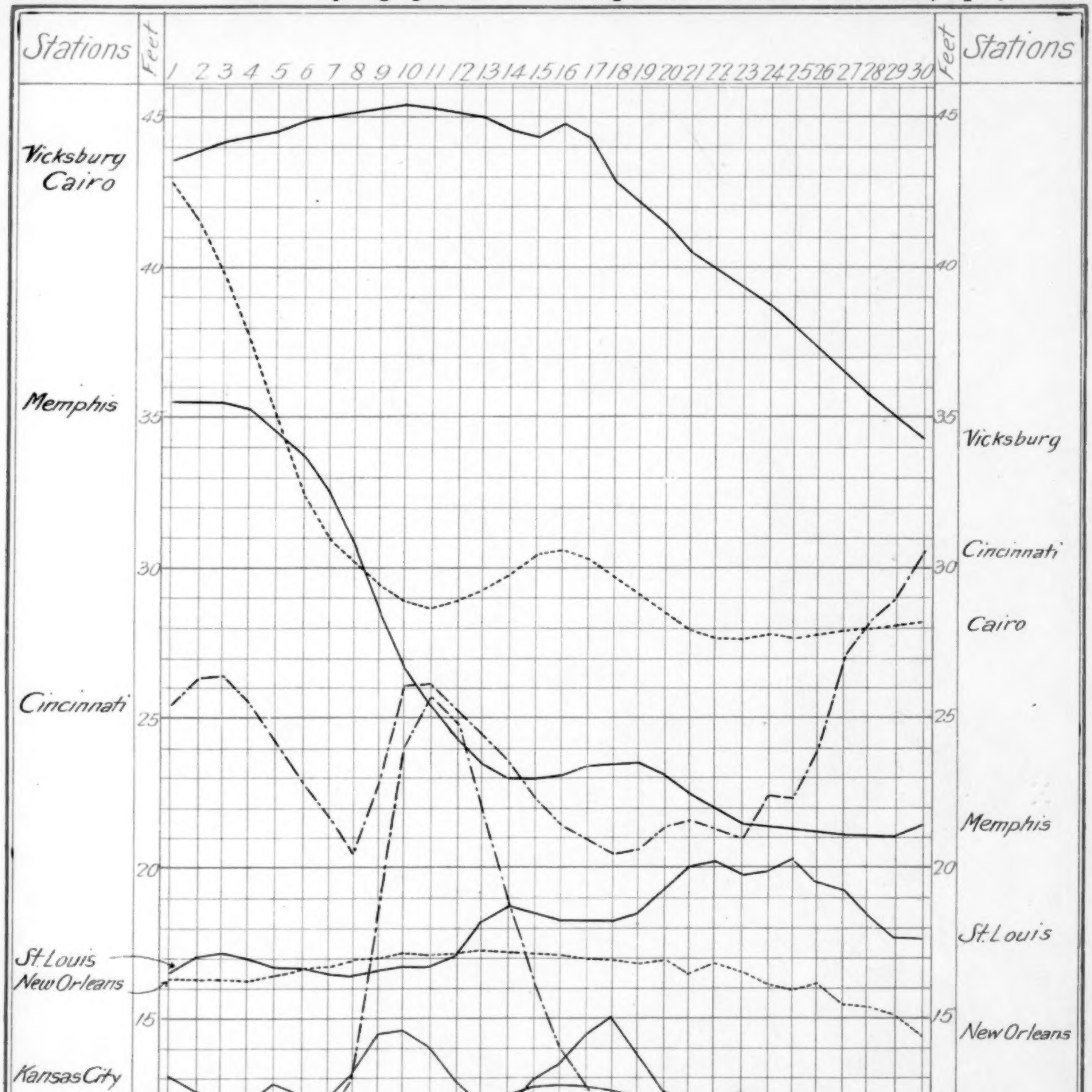


Chart II. Tracks of Centers of High Areas, April, 1907.

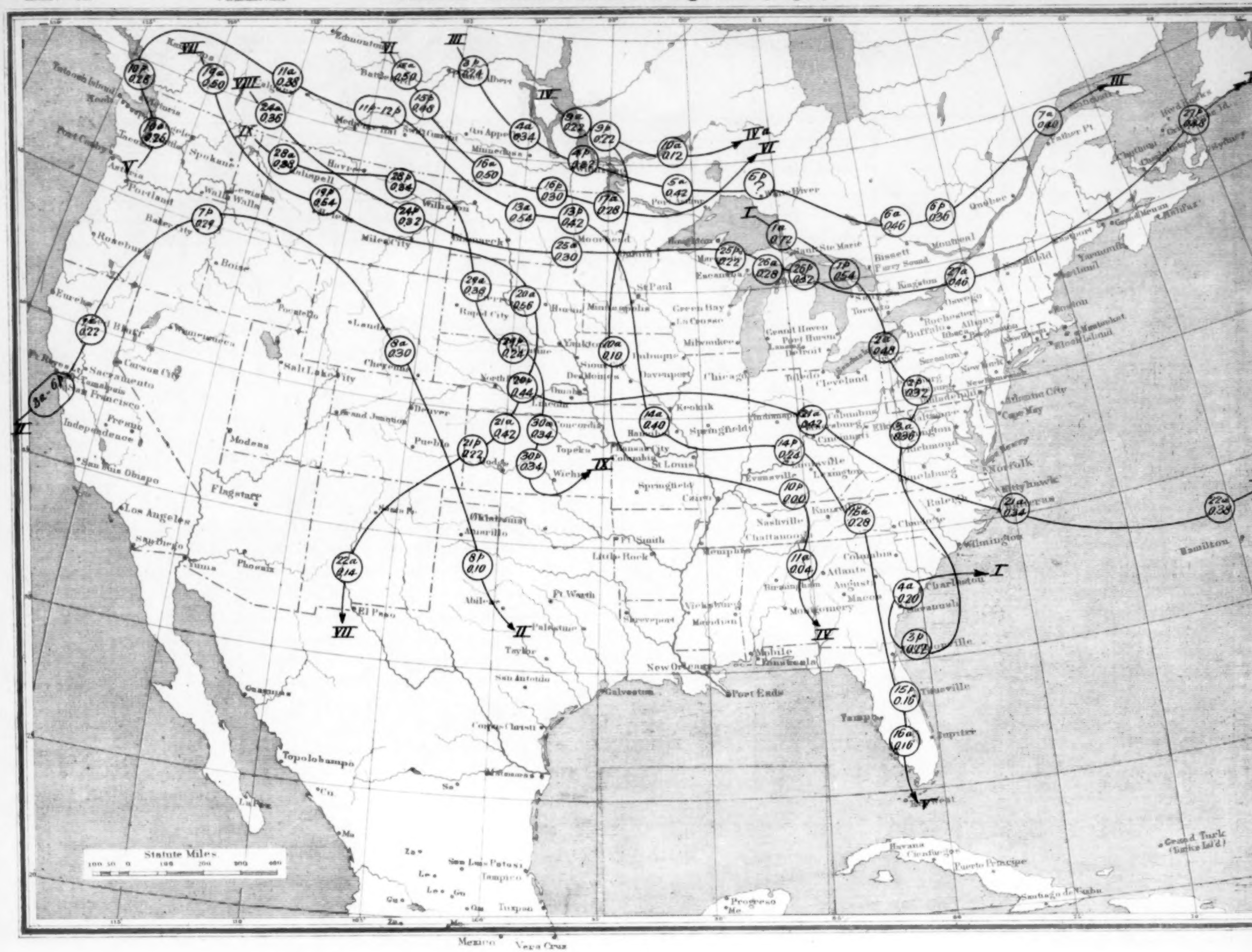


Chart III. Tracks of Centers of Low Areas, April, 1907.

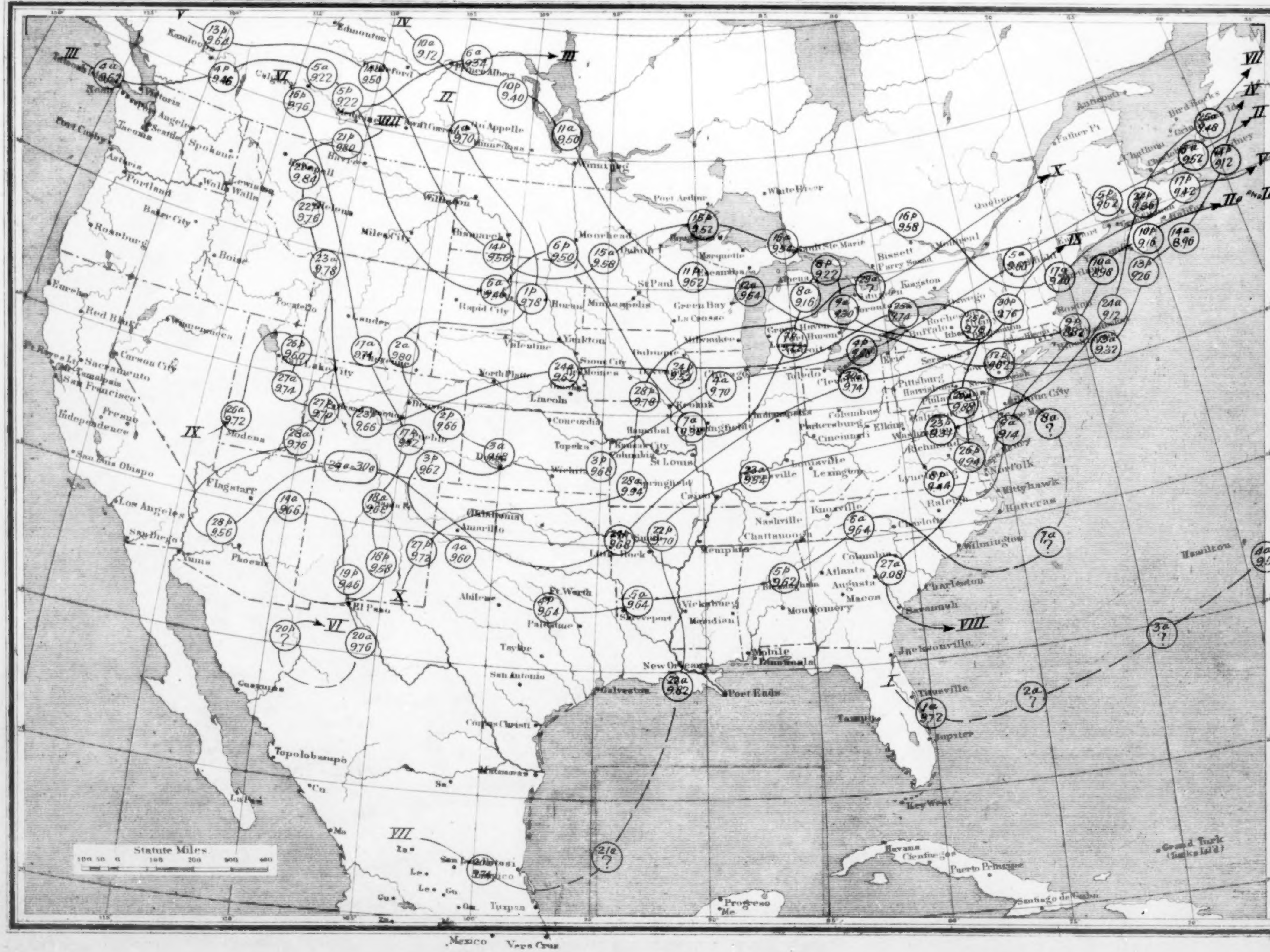


Chart IV. Total Precipitation, April, 1907.

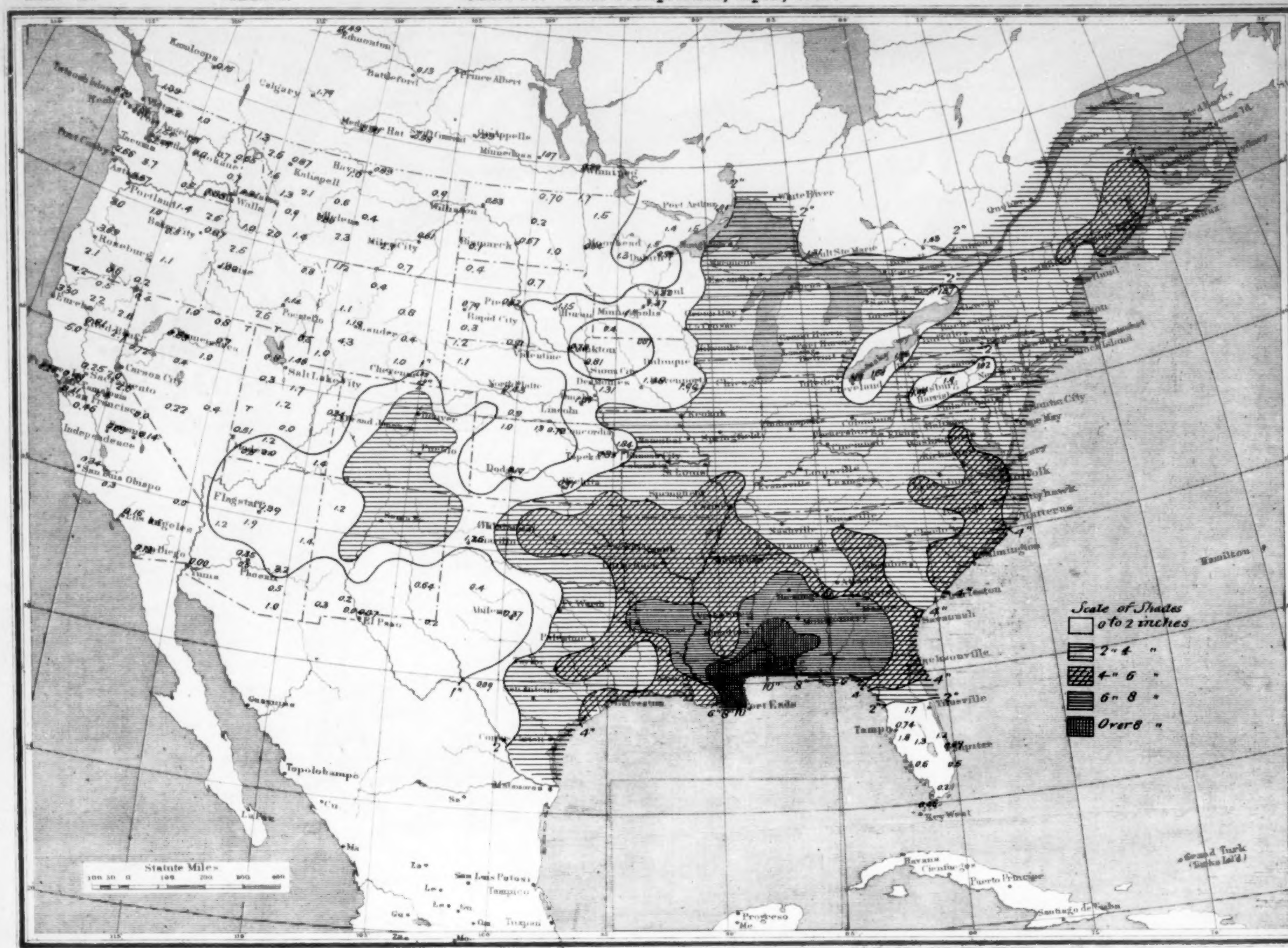


Chart V. Percentage of Clear Sky between Sunrise and Sunset, April, 1907.

Chart V. Percentage of Clear Sky between Sunrise and Sunset, April, 1907.

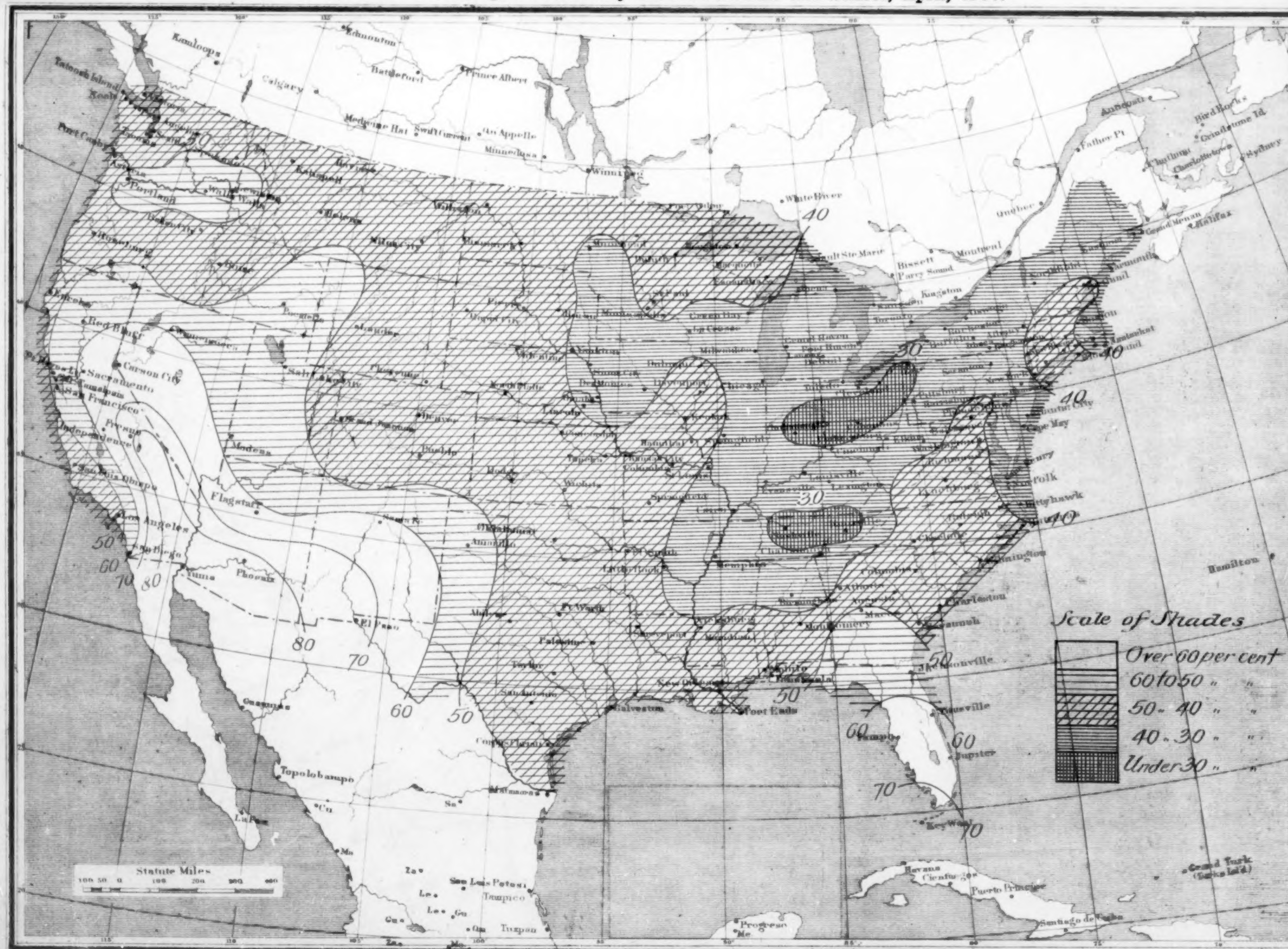
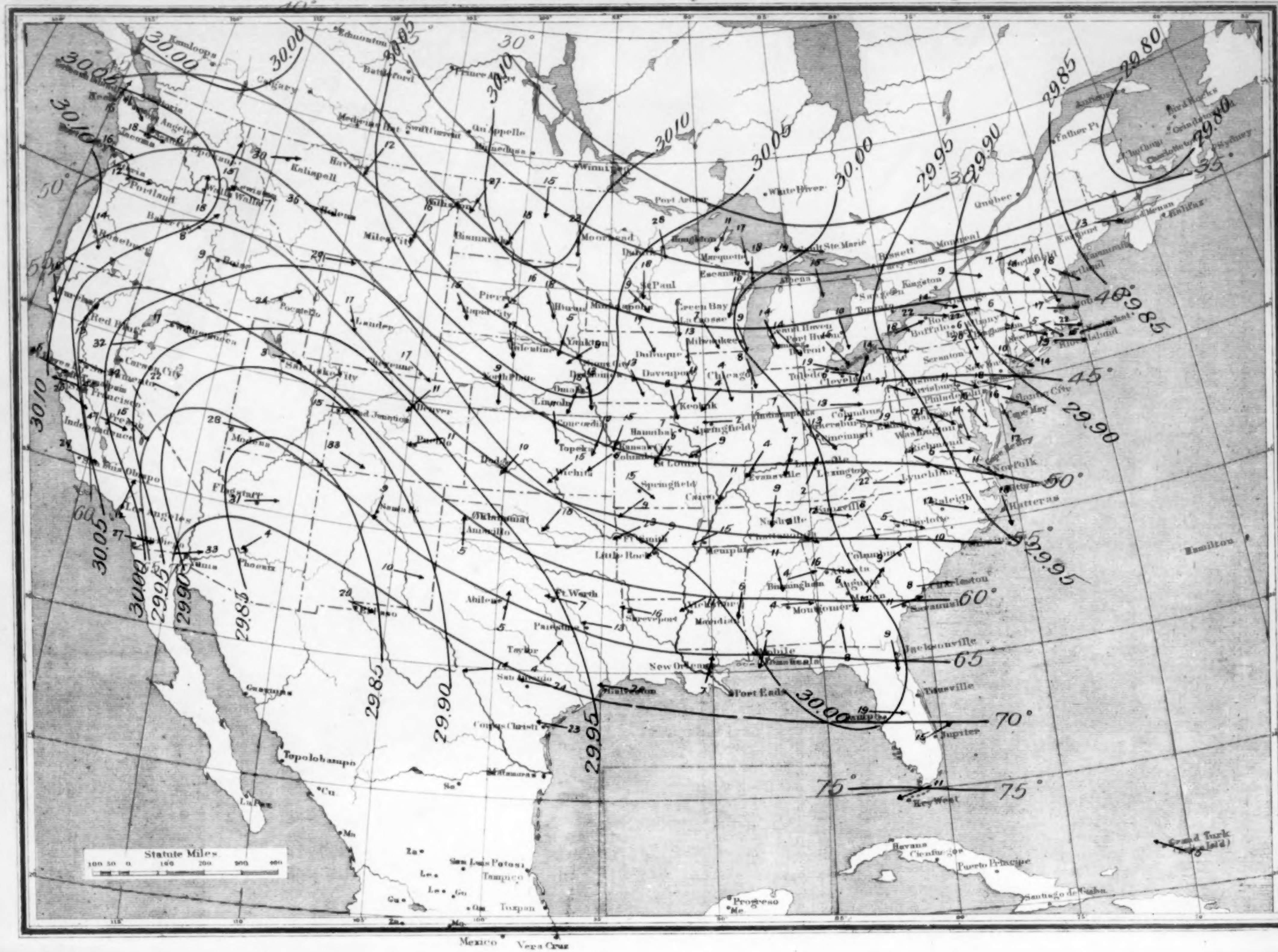


Chart VI. Isobars and Isotherms at Sea Level; Surface Wind Resultants, April, 1907.



XXXV—36.

Chart VII. Total Snowfall for April, 1907.

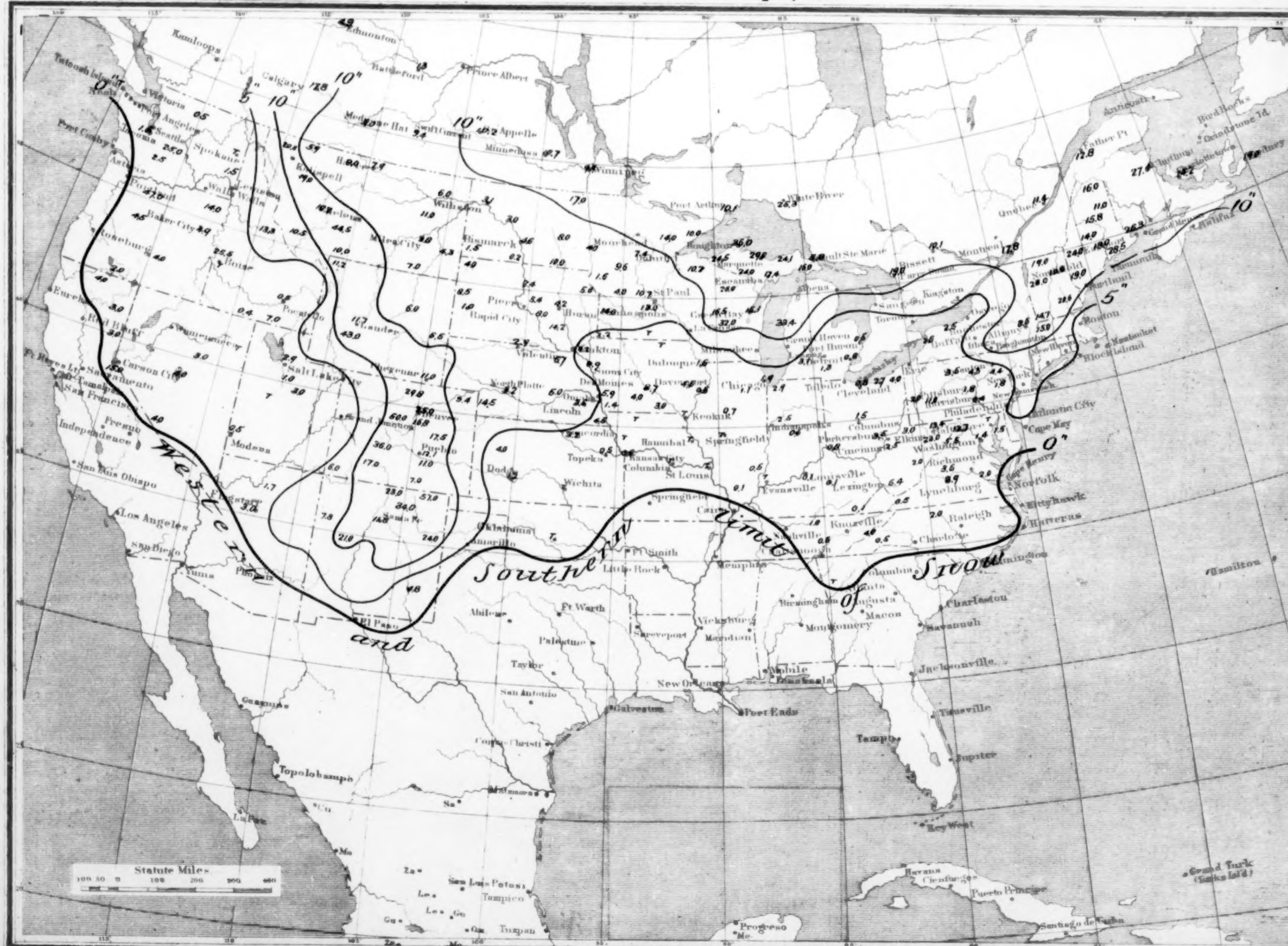
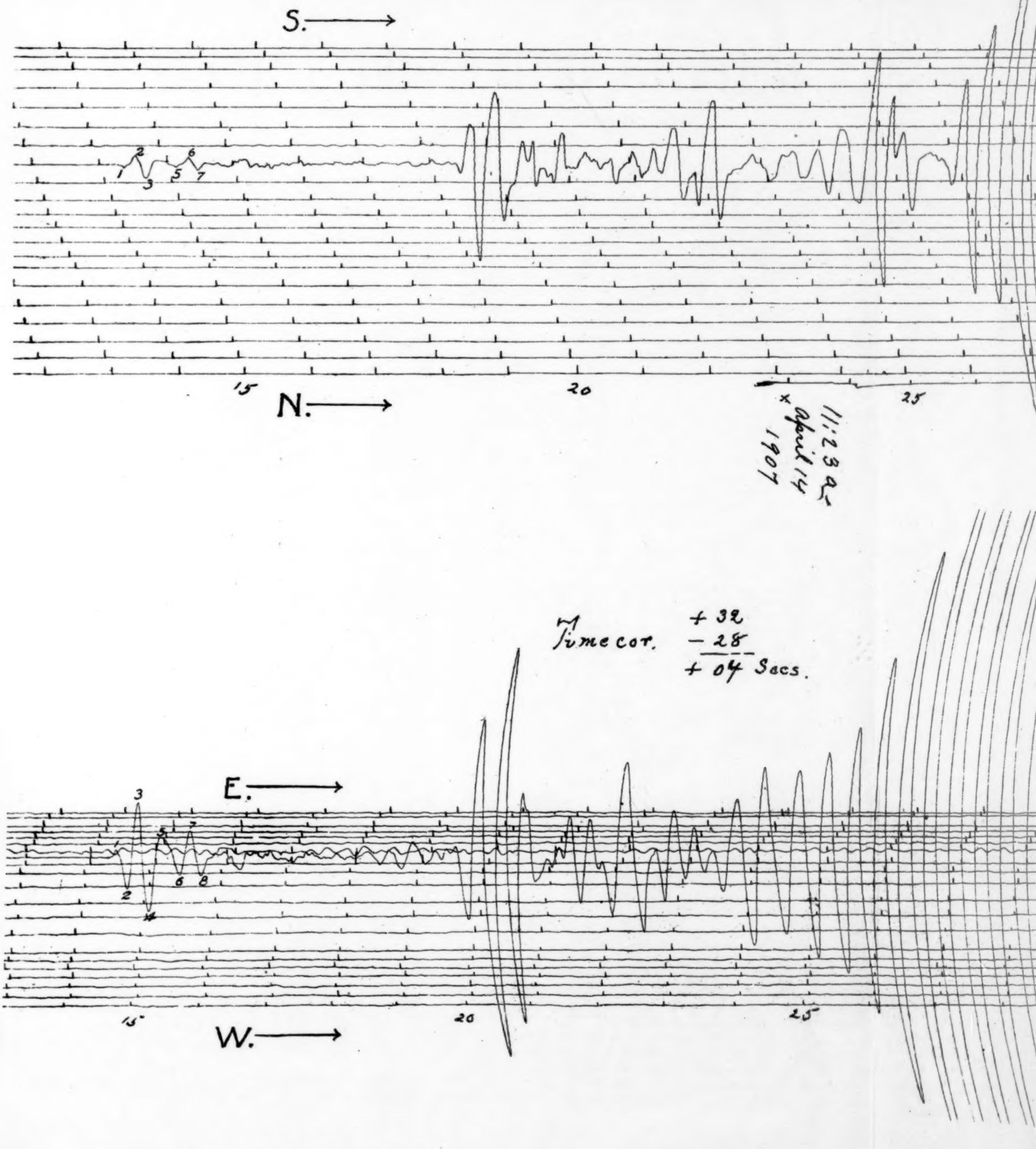
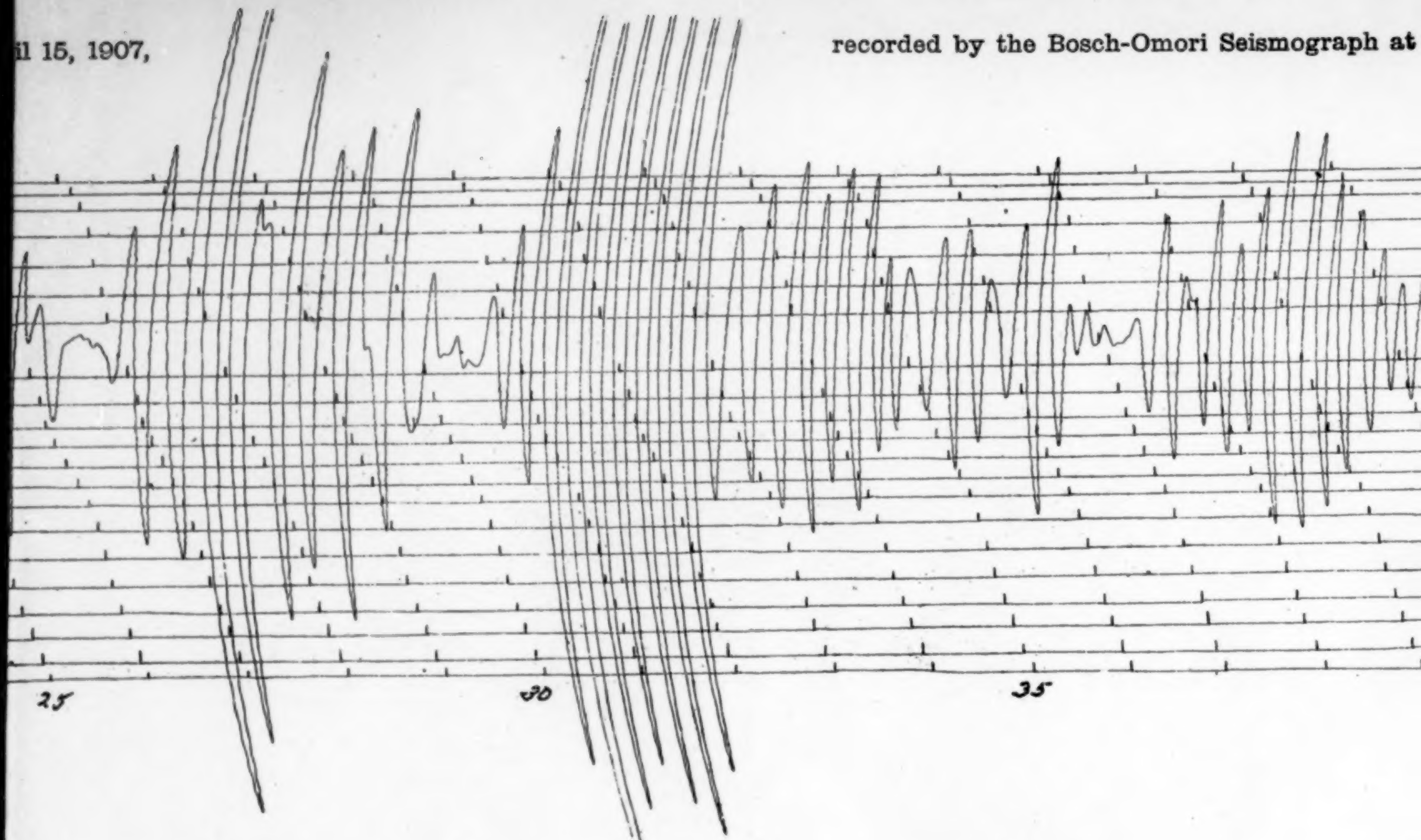
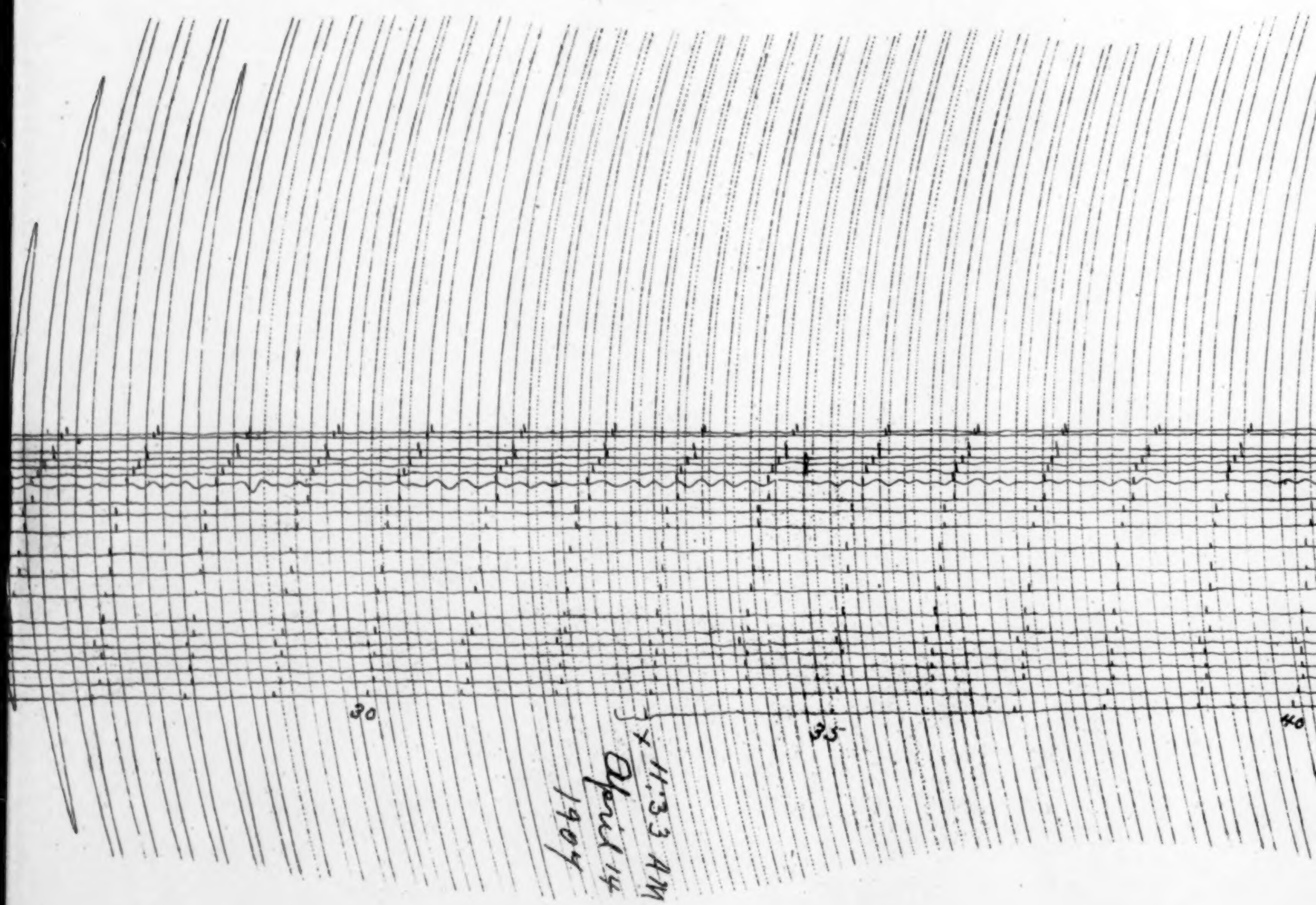


Chart IX. Mexican Earthquake of April 15, 1907,



il 15, 1907, recorded by the Bosch-Omori Seismograph at





ograph at the Weather Bureau, Washington, D. C.